Chapter 4

SHAPING THE BATTLEFIELD

At precisely 0200 on the morning of January 17, 1991, a group of Iraqi soldiers standing watch just beyond the border berm was startled by the scream of turbines and the beat of helicopter rotors passing just a few feet above them. Seconds later, trailing rotor wash buffeted the terrified Iraqis and covered them with stinging particles of flying sand. The thundering sound of the invisible armada faded quickly as the Apaches rushed northward deep into the Iraqi soldiers' homeland. Inside the aluminum and titanium cocoon of White Three, the lead Apache in the six-helicopter formation, both pilots could sense little else but the narrow, red-lit world defined by their instruments. Chief Warrant Officer Dave Jones was totally focused on an inch-square lens at the end of a tube attached to his helmet and positioned just in front of his right eye. Although the Army named this the Pilot's Night Vision Sensor, pilots simply called it "the system." The outboard part of the system, an infrared sensor, was slaved to follow Jones' head movements, and as he looked through the eyepiece he could see a surreal photonegative image of a giant Air Force MH-53J Pave Low helicopter just 50 feet to his left front. Digital altitude and airspeed numbers flashed along the rim of his eyepiece to enable Jones to fly without having to look back inside the cockpit. In the front seat Chief Warrant Officer Tom "Tip" O'Neal strained to catch visual cues through the narrow tubes of the ANVIS-6 night vision goggles. The goggles' twisted fiber-optic bundles amplified the limited light of the moonless night enough to allow O'Neal to continue flying should anything knock out or degrade the system. Just south of the border, O'Neal picked up flashes from Iraqi machine-gun fire and the bright streak of a heat-seeking missile launched by some nervous Iraqi at unseen objects above him.

The Pave Low helicopters, their Air Force partners, were along to assist the Apaches in navigating to the release point using their

sophisticated inertial and satellite navigation system and terrain-following radar. The Pave Lows—White One and Two—would also be ready to rescue Apache crewmen should anyone get shot down. In addition to the two Pave Lows, four Apaches flew in an echelon right formation. In the back seat of White Six was Lieutenant Colonel Dick Cody, 1-101st Aviation, the commander of Task Force Normandy.

Jones and O'Neal had been together since their unit had first received Apaches at Fort Hood, Texas, more than two years earlier. Jones was a square-jawed Indiana native with sandy blond hair, a ready smile, and a self-effacing modesty that belied his extraordinary skill and confidence. Sixteen years in the Army, 10 of them in the cockpit, and experience as an AH-1 Cobra instructor pilot made him the "old pro" in a company comprising mostly younger men. Cody referred to Jones as his "recruiting poster for warrant officers."[1] *His co-pilot had less than six years in the Army. Dark-haired, with a mustache and wide-set eyes, O'Neal was a true product of the eighties. His battalion handle, "Gadget Man," aptly described his knack with computers and his wizardry with Apache electronics.*

The six White Team helicopters, flying in total radio silence, crossed the border at 120 knots at an altitude of 75 feet. Although the Apache's environmental control unit blew a steady stream of fresh air into their faces, the crewmen felt some discomfort in their bulky chemical overgarments. From 40 kilometers out, O'Neal could make out a glimmer of light near the target. Oblivious to the threat of war, the Iraqis had left the lights on. The team slowed to 80 knots and descended to 50 feet as they approached the release point. Two minutes later Jones saw the Pave Lows slow to a hover. Through his goggles O'Neal could see intense points of light drop to the ground as the MH-53J crews dispensed chemical light sticks to precisely mark the location of the release point.

Jones hovered carefully over the chem lights to allow O'Neal to update his navigation system. After selecting the prestored coordinates on the keyboard of the Doppler navigation control head, O'Neal pressed the "enter" button to reinitialize his fire-control computer. The remaining White Team Apaches completed the update and followed Jones as he edged up to his first firing position 5.5 kilometers from the Iraqi radar complex. Twenty kilometers to the west, the Red Team of two more Pave Lows and four Apaches completed the same maneuver south of a second radar complex.

In clipped, mechanical tones, Jones and O'Neal methodically worked their way through the prefire checklist to set up for the first target. Jones

maintained a steady hover while, in the front seat, O'Neal flipped the night vision goggles up off his face and looked down at the video screen of his primary target-acquisition system. With the right handgrip manual tracker switch, he slewed the laser onto his first target, a square, box-like object on his screen that defined a dug-in electric power generator just a few meters to the left of the main Iraqi command and control van. By hitting power sources first, the pilots would silence the radar site before it could alert the Iraqi central control headquarters in Baghdad. The laser spot was centered on the target approximately 4 miles away. O'Neal punched in the lower left outboard missile and spun it up so that the missile would recognize the coded laser energy reflected from the target once he squeezed the launch trigger.

While O'Neal was engrossed in his work, the rest of White Team fanned out on line, settling into position at 0237, exactly 57 seconds early. For the longest minute of the war, four Apaches hung suspended in total darkness 50 feet off the deck. Lieutenant Tom Drew in White Five broke radio silence just long enough to broadcast "Party in ten," the code to fire in 10 seconds.

At precisely 0238, O'Neal launched the first shot of Desert Storm. Jones faintly heard the muffled swoosh and the familiar sparks thrown aside by the Hellfire's booster motor. In a second the missile disappeared into the darkness. Jones calmly whispered into the intercom, "This one's for you, Saddam," as he kept the target box in his small screen aligned with the pipper indicating O'Neal's line of sight. O'Neal's right thumb was on the manual tracker switch holding the laser spot on the generator and sending digital information to Jones on where the target-acquisition system was focused. Seconds later the missile streaked in from the upper left of O'Neal's video screen. The explosion momentarily "whited out" on O'Neal's screen as 17 pounds of Hellfire explosive vaporized the generator.

O'Neal immediately "squirted" the laser on the second target, a nearby command and control van, and took it out with a second missile. On the periphery of his screen he could see the methodical destruction of the site as other team members, moving steadily forward at an even 20 knots, hit antennas, radar dishes, and buildings. Within minutes Jones could see nothing through his infrared sight but burning dots of light.

Jones guided the Apache forward in line with the other aircraft and broke off the attack just 1,500 meters from the target. In four minutes White Three had scored seven for seven. O'Neal had hit the westernmost end of the site, while the other White Team Apaches struck the buildings

and radar dishes in the middle and eastern end. Completely destroyed, the site would not reactivate during the war. White and Red Teams collectively created a 40-kilometer gap in the line of early warning sites that ran the length of the Iraqi-Saudi Arabian border. Leaving the radar site in flames, the Apaches slipped smoothly into formation with the Pave Lows and turned south, 50 feet above the desert floor.

FINAL REINFORCEMENTS

Even as Task Force Normandy opened up the Iraqis' extreme western flank to Coalition air, Saddam continued to improve his defenses in Kuwait. Forty-one Iraqi divisional headquarters were in the theater, an increase of 13 since November.[2] Five of the new units were infantry divisions that joined the coastal and forward defenses. Three additional regular army armored divisions completed the formation of two regular army corps, which would serve as operational reserve for the KTO. The first, the Jihad Corps, consisted of the 10th and the 12th Armored Divisions and was oriented on the defense of the Wadi al-Batin. The second, the 2d Armored Corps, made up of the 17th Armored and 51st Mechanized Divisions, was fixed on the defense of mainland Kuwait from amphibious assault. The creation of these two corps-sized operational reserves freed up the Republican Guard to act in its traditional role of strategic reserve.

The rest of the new divisions—all infantry—deployed west of Kuwait, thickening and adding depth to the defenses in that area. Two went into the line just west of the Wadi al-Batin. The other three deployed along key lines of communication as far west as as-Salman and as far north as an-Nasiriyah and an-Najaf. The Iraqis, however, had failed to close off the western approach to the KTO with an obstacle belt as extensive as the elaborate one inside Kuwait. Analysts examining the defenses believed that Saddam had decided to accept risk in the west, probably assuming that a western attack would be too difficult and the route too long for the Coalition to consider. Saddam had a residual force of 24 divisions in Iraq, largely the dregs of recently mobilized infantry units that possessed little military value. Therefore, further reinforcement of the theater was unlikely. Obviously, Saddam had left the back door to the KTO open, and from all appearances he had neither the capability nor the inclination to close it.

SEEING THE BATTLEFIELD

Developing a comprehensive intelligence picture of the Gulf had not been easy. The US intelligence community had spied on the Warsaw Pact for decades using signals intelligence (SIGINT), human intelligence (HUMINT), and imagery intelligence (IMINT). The rapid development of the

IRAQI DISPOSITIONS—MID-JANUARY
IRAN
IRAQ
KUWAIT
SAUDI ARABIA
PERSIAN GULF
KUWAIT CITY
BASRAH
AN-NAJAF
150 KM
AS-SALMAN
AL-BUSAYYAH
JALIBAH
NEBUCHADNEZZER
AL-FAW
ADNAN
MEDINA
HAMMURABI
RGFC
JIHAD
TAWAKALNA
ENLARGED AREA
APPROXIMATE STRENGTH
546,700 SOLDIERS
4,280 TANKS
2,880 APCs
3,100 ARTILLERY
LEGEND
SPECIAL OPERATIONS FORCES
REPUBLICAN GUARD
OTHER ARMY UNITS
Infantry Units
Mechanized Units
Armor Units
0 25 50 75 100
KM

Gulf crisis in mid-1990 meant that the intelligence system had to be turned quickly against an unexpected foe. Problems were inevitable.

An enemy's intentions can be most effectively determined from high-level intelligence sources. Saddam's occupation of Kuwait presented the US with its first major post-Cold War intelligence dilemma. The 45-year standoff in Central Europe permitted the US to do sophisticated collection from a variety of means—strategic, operational, and tactical—and to fuse that intelligence for use at every level. Warsaw Pact intentions were known, and most importantly from the tactical level, detailed knowledge of Warsaw Pact commanders and capabilities was the basis for planning. In Europe, intelligence battalions down to division level provided continuous coverage and updates on the "enemy" situation.

Baghdad's concept of a defensive war of attrition, coupled with an appreciation of American skill in electronic eavesdropping, caused the Iraqis to harden much of their command and control system and impose severe limits on radio and radar transmissions. The US effort was further hampered by the need for Arabic linguists, particularly those skilled in the Iraqi dialect, to exploit what little data could be gathered. Once the air war began, however, signals intercepts became more profitable as hardened communications were damaged or destroyed and the Iraqis were driven to use less secure communications.

Human intelligence was particularly difficult. Because the brutally efficient Iraqi internal security regime was extremely paranoid of foreign intelligence penetration, clandestine HUMINT—spying in the classic sense—was almost impossible. Nevertheless, HUMINT did play a key role in assessing Iraqi capabilities and targeting the Iraqi military. Years of data collection on Soviet equipment elsewhere in the world provided comprehensive information on much of Iraq's arsenal. While the lack of Arabic linguists hampered many units, the 101st Airborne Division deployed with 132 trained linguists who were put to great use in debriefing Kuwaiti refugees prior to Desert Storm. US Army intelligence played a large part in this effort, debriefing more than 400 sources.

The decline of Soviet military power freed the intelligence community to shift focus to the Iraqis. However, even without Soviet distractions, demands on the available intelligence systems were enormous. They were expected to support enforcement of the blockade by monitoring land, sea, and air traffic into Iraq. Early in the crisis, national systems searched for Western hostages. Later, targeteers required thousands of photographs to provide the detail necessary to prepare target folders to support the bombing operation.[3] With its generally clear skies and sparse ground cover, the KTO was an ideal region for overhead observation. However, the KTO was poorly mapped and overhead systems were needed to support the development of 1:50,000-scale maps for an area the size of the

eastern United States. The same systems were then used to monitor Iraqi military deployments inside both the KTO and Iraq. This heavy load created periodic gaps that could result in losing track of entire Iraqi divisions.

Reconnaissance aircraft could have bridged the gap in coverage. With its MACH III+ speed, the SR-71 Blackbird was capable of flying over Kuwait at will as it had done in the 1973 Arab-Israeli War, photographing a 30-mile swath at 2,000 miles per hour. The SR-71, however, had been mothballed only the year before. Reconnaissance aircraft available in theater—RF-4C, U-2, TR-1, and Tornado—could produce wide-angle imagery but were not survivable enough to fly over the KTO until a coordinated air operation began. [4]

In addition to problems in seeing the battlefield, getting the information to the users proved difficult. Doctrine calls for units in contact with the enemy to use their tactical intelligence or reconnaissance means to collect information against him. Forward units are responsible for developing information on the disposition and composition of enemy forces to their direct front. The higher headquarters then combines that information with additional data to form a picture of the enemy at a specific level, normally two echelons below their own. For example, battalions are concerned with platoons, and brigades with companies. The higher the unit, the wider and deeper the focus. The tactical intelligence structure was designed to draw intelligence from the bottom up, building on it gradually as it proceeds upward. The corps is the upward limit of the tactical intelligence system.

In contrast, strategic intelligence, intended to support a host of users at the national level, has only limited application to tactical theaters. It is generally suitable for longer-term planning, usually at theater or national level. While strategic intelligence organizations are capable of producing tactical intelligence, it is not their primary mission. That is not to say that extremely detailed information was unavailable from very high levels. In some cases strategic sources in the US or Riyahd had imagery on individual emplacements and weapons. Intelligence units above corps, like ARCENT's 513th MI Brigade, are intended to bring strategic and tactical intelligence together. They fuse national products with those of the corps and below, giving the theater commander a comprehensive picture of the enemy.

In the desert, commanders' expectations, especially below corps, remained unmet. They required much more specific intelligence than ever before, driven in part by the burgeoning information required to fully apply precision weapon systems in an offensive operation. Finished intelligence produced at the national level was not necessarily suitable for tactical planning. At the same time, Schwarzkopf's decision to bring in

ground combat units first delayed arrival of higher-level intelligence battalions. The first such unit could become only partially operational by September 7 since all of its personnel and equipment did not arrive until November. The only Army aerial collection capability—III Corps' 15th MI Battalion which replaced the XVIII Airborne Corps' organic 224th MI Battalion still in the US on counterdrug operations—did not arrive until mid-October. The critically needed Joint Imagery Processing Center—the only facility that could produce annotated, hard-copy photographs—did not arrive until December. ARCENT's organic intelligence structure was not complete until C+160, the day the air operation began.[5] Moreover, in order to mask intentions, CENTCOM directed that intelligence collection units remain well back from the border, severely hampering their effectiveness. Thus XVIII Airborne Corps' MI battalions arrived between September and October but were unable to develop a good picture of the battlefield until they moved into forward positions on January 19. The same proved true for VII Corps. Not configured for contingencies and embedded in the NATO intelligence structure, VII Corps had to rely on higher echelons for most intelligence information.[6] The intelligence structure, designed largely for the defense of Europe, was inadequate for the grand offensive maneuver envisioned for Desert Storm.

CREATING AN UNBLINKING EYE

The initial task of national strategic intelligence was to maintain an accurate picture in the KTO at a level sufficient to satisfy tactical planners. The Defense Intelligence Agency, the intelligence arm of the Joint Staff, needed outside assistance to meet the increased tactical demands. The DIA responds to a host of users including the National Command Authorities, the unified commands, and other departments. Neither it nor the CENTCOM J2 was staffed to produce sufficient tactical intelligence. While the DIA had some analysts well-versed in tactical intelligence, the agency's requirements pulled them in many directions. Obtaining the level of detail required by each Service requires a fundamental understanding of that Service's needs. Knowledge of Army tactics, weapons, and operational methods enables trained analysts to cull very specific information of value to tactical commanders. An Army officer reviewing satellite photos of ICBM sites could count the individual silos, but he would not be able to pick out other details to know if the installations were operational. Each Service carries its own cultural values and technical expertise developed from many years of military experience. Making tactical intelligence assessments without the benefit of such a background is difficult, if not impossible. In the case of the Iraqi invasion of Kuwait, an inexperienced analyst looking at the Iraqis shifting forces to the border on August 1 believed that they were merely training. Only an Army

officer familiar with the last-minute starts and stops of tactical maneuver saw the moves as a final shift to attack positions.

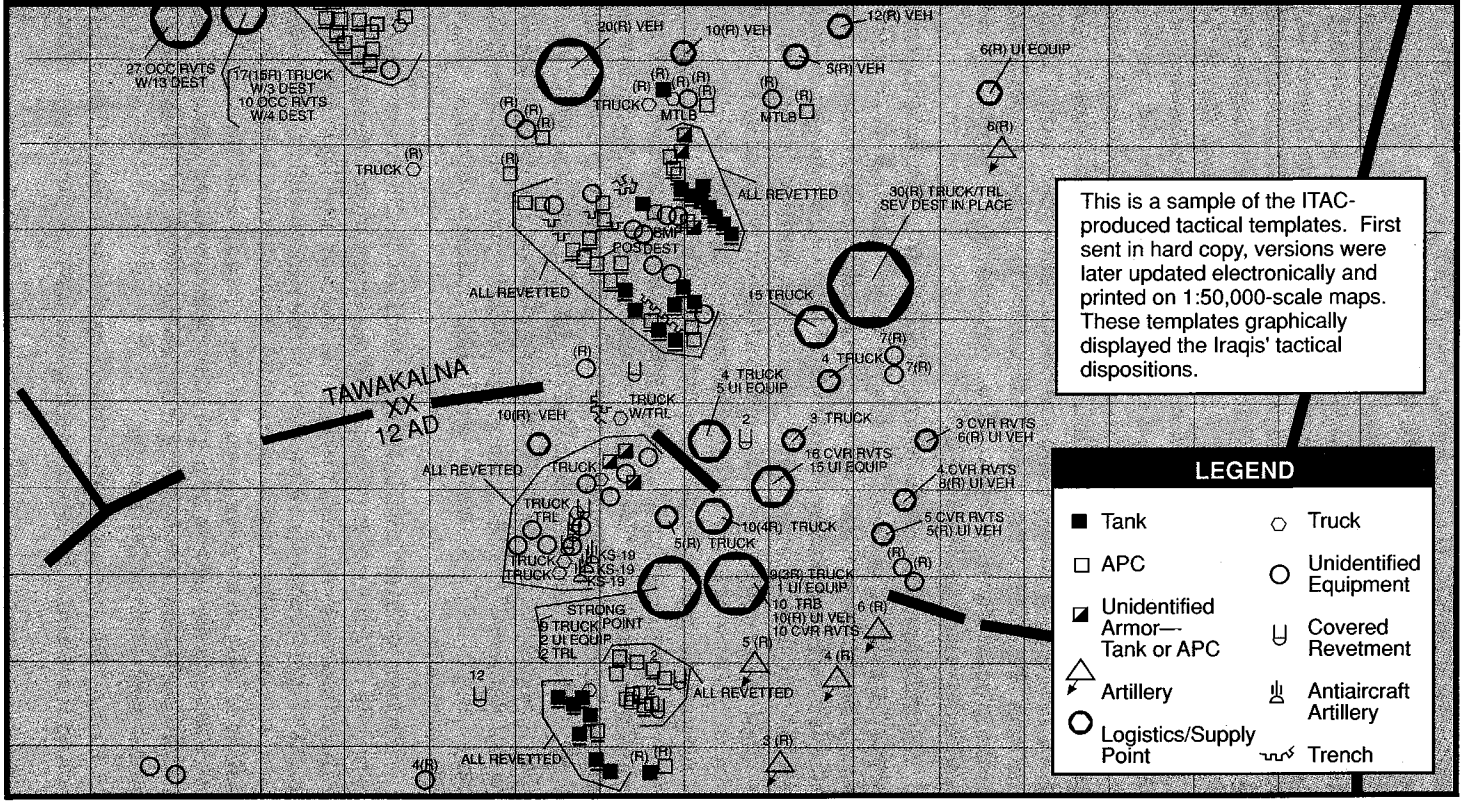
The individual Services were capable of developing Service-specific tactical intelligence at the national level and, in an unprecedented move, agreed in late August to man a DOD-level Joint Intelligence Center in Washington to produce tactical intelligence for the KTO. One of the most successful examples of their extraordinary effort was the series of tactical "templates" produced by the Army's Intelligence and Threat Analysis Center (ITAC). First produced in hard copy and later transmitted digitally, the templates depicted every Iraqi division in the KTO on 1:50,000-scale maps. Accurate to 400 meters, the templates showed individual tanks, armored vehicles, artillery positions, trucks, command posts, and supply facilities and provided commanders with a blueprint of the Iraqi obstacle system. To ensure that the templates remained accurate as the ground war drew close, ITAC provided a daily update on the Iraqi defenses west of the Wadi al-Batin.[7]

Washington's efforts, however, did little to make field commanders happy, particularly after VII Corps arrived from Europe and began offensive planning. Dissemination remained a problem and even though satellites were producing thousands of miles of coverage per week, the appetite for tactical information was almost limitless. Unit commanders wanted target-quality photographs annotated with locations of specific objects down to the nearest hundred meters. Of course variations existed among units, especially between the corps. XVIII Airborne Corps, as the Army's contingency corps, was better structured to deal with strategic intelligence agencies. The corps received fully processed satellite imagery via the Tactical Exploitation of National Capabilities (TENCAP) Imagery Exploitation System located at Fort Bragg. ARCENT and VII Corps lacked such a capability. As for battlefield surveillance, the need to maintain an "unblinking eye" on the enemy, particularly once the war began, made the sporadic and sometimes spasmodic imagery coverage of the KTO unacceptable.

The lack of terrain intelligence, particularly in the western Iraqi desert, compelled XVIII Airborne Corps to take extraordinary measures to gather terrain information. Luck made it his highest intelligence priority, and made frequent requests for imagery on the region with little success. After he was given permission to conduct cross-border operations, he was forced to rely on long-range surveillance patrols and the use of Apaches to videotape the terrain at night with their on-board cameras. Selecting supply routes and determining trafficability were critical calls that had to be delayed until the last minute.

Part of the answer to the dissemination and surveillance problems would come from the Army intelligence team in the United States. This

TAWAKALNA MECHANIZED DIVISION TEMPLATE—FEBRUARY 15, 1991



team fielded 12 major systems with more than 100 major end items between early January and February 24. In battlefield surveillance, two systems proved invaluable: the Joint Surveillance Target Attack Radar System (JSTARS) and the unmanned aerial vehicle (UAV).[8]

Before Desert Shield, the Army and the Air Force had been developing JSTARS, principally as a means to help the ground commander determine which deep targets to attack and when. JSTARS is a highly modified Boeing 707 aircraft equipped with a synthetic aperture radar. In the targeting mode, the radar can search a 4x5-kilometer area and provide locations of assembly areas and individual vehicles to an accuracy sufficient for attack by air or artillery. As a surveillance system, JSTARS can range several hundred kilometers to paint a 25x20-kilometer sector. It would be able to watch all of Kuwait and major portions of southern Iraq. The system was designed to operate in both modes simultaneously. In either mode, JSTARS can detect all moving targets and many stationary features such as the Iraqi obstacle system. Information produced by the radar could be passed to ground stations and AWACS in near real time.

Prompted by Brigadier General John Leide, CENTCOM J2, Schwarzkopf requested on August 10 that the two existing JSTARS prototypes be released to participate in the surveillance war.[9] The suggestion ran into resistance in Air Staff systems-development circles at the Pentagon and at the Tactical Air Command at Langley Air Force Base. The Air Staff did not want to risk the prototypes and possibly the entire program should they be lost. Tactical Air Command and, by extension, General Horner, the JFACC, did not want the headaches that JSTARS and its ground support components would impose on a theater support system already stretched to the limit. Air Force pressures against deployment prompted Schwarzkopf to reverse course in September, saying that "Desert Shield is not suitable in time or place for the introduction of JSTARS."[10]

The issue was not dead, however. Battlefield coverage by overhead systems remained a serious problem that would probably worsen in the winter. December, January, and February, normally cloudy months, could reduce photographic coverage by 40 to 60 percent. Meanwhile, VII Corps' European JSTARS tests proved so successful in September that General Vuono pressed for deployment of the system, as did General Franks upon his arrival in theater in November. The Air Staff acquiesced after Congress questioned why the system had not been deployed.[11] The CINC requested that JSTARS arrive in theater no later than January 15.

The JSTARS package that was deployed consisted of two E-8A aircraft and six ground stations that would be able to maintain almost continuous coverage over the KTO in nightly 11-hour flights inside Saudi air space. The system complemented side-looking airborne radar missions mounted

by XVIII and VII Corps' own organic Mohawk aircraft. Ground stations were deployed at CENTAF Tactical Air Command Center, ARCENT Main, ARCENT Forward, and with the Marines, VII Corps, and XVIII Airborne Corps. As ARCENT's main effort, VII Corps had priority for JSTARS coverage.[12] Much of the time XVIII Airborne Corps was unable to receive JSTARS data because its ground station module was so far to the west at Rafha.

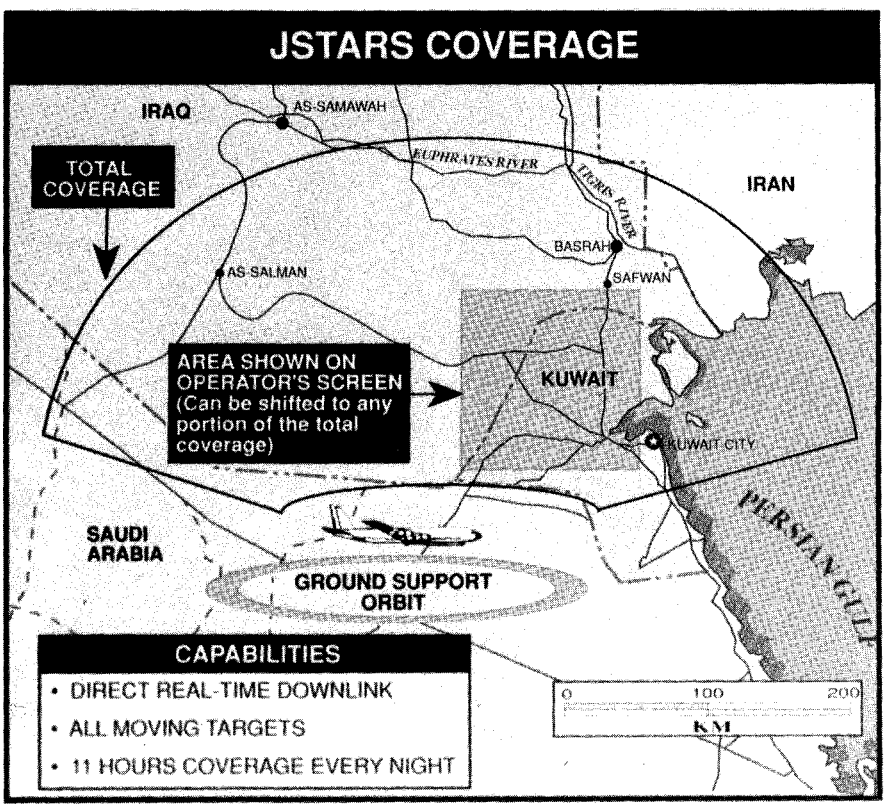
The system first flew January 14, less than 72 hours before the air operation began. The flight crew was joint Army-Air Force with the Army manning JSTARS ground stations with a sergeant and two soldiers—an action that raised Air Force eyebrows. Horner and his staff already regarded the system with some suspicion; the level of rank the Army assigned to it further colored their view of its utility.

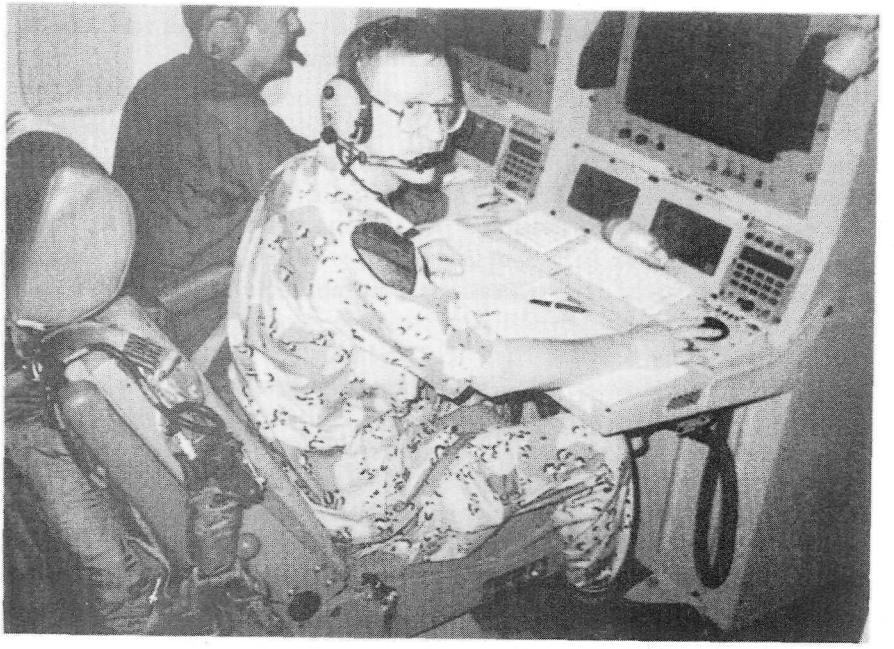
Soon after the shooting started, cloud cover over the KTO seriously restricted target detection. Aircraft arrived on station ready to bomb, however, and Horner's staff found themselves with B-52s inbound to the KTO with no suitable targets. When someone suggested JSTARS, Horner said, "Fine, get the officer in here." Shortly afterward, Private First Class Timothy Reagan was ushered in. He explained that his sergeant was in the latrine. Horner asked if he had any targets. Reagan led the skeptical general out to his JSTARS ground station and showed him a convoy of some 40 Iraqi vehicles that he had tracked for the previous half-hour. Convinced by the evidence—and impressed by the young soldier's expertise—Horner directed the bombers against the convoy and watched on

Boeing 707 configured as JSTARS.

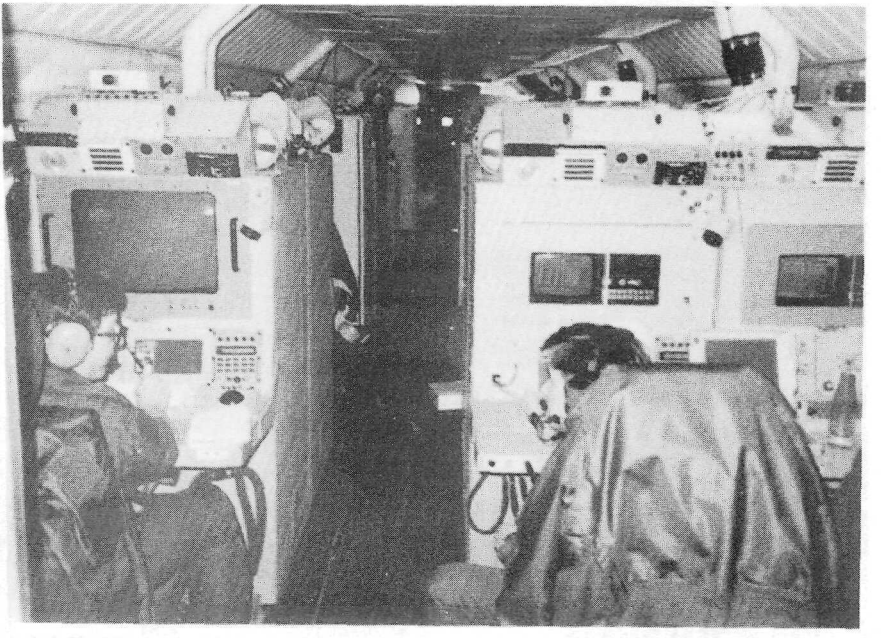
Reagan's monitor as the B-52s destroyed it. Private Reagan had "made" JSTARS in the eyes of the air component commander. [13]

Although JSTARS guaranteed all-weather coverage to a depth of 150 kilometers, tactical commanders still needed a close-in system to see over the next hill. XVIII Airborne Corps capitalized on the Horus radar possessed by the French 6th Light Division. Horus is a prototype moving-target indicator mounted on a Puma helicopter that functions much like the JSTARS. In its first use, the all-weather Horus cued Apaches and MLRSs for night deep operations. Another technical solution was to employ drones—UAVs in military parlance—equipped with television cameras and other sensors. The Navy and Marines possessed the Israeli-designed Pioneer drones. When the air attacks started, the Army had only an experimental platoon of five Pioneer UAVs at Fort Huachuca, Arizona. With a 100-mile range, day-and-night capability, multiple-hour endurance, and near-real-time data link, the Pioneer could have served both as a scout and as a means of precise, instantaneous targeting. However, the Army's single platoon did not arrive in theater until January 26 and did not fly its first mission until February 1. As the main attack force, only VII Corps would have access to Pioneer. [14]

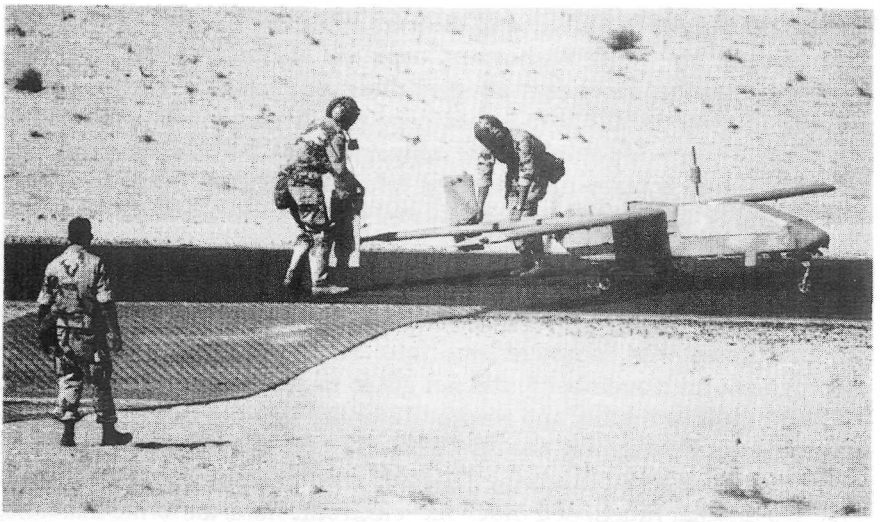




Colonel David Schulte, chief of the BCE, manned an operator's station during a JSTARS orientation mission.



JSTARS operators followed the ground war from 10 stations, two of which were manned by Army personnel.



Military Intelligence soldiers preparing a UAV for a VII Corps targeting mission.

The other half of the intelligence problem was dissemination, with imagery the biggest challenge. The intelligence system before Desert Storm was not designed to push all the required intelligence down to the tactical level. During the previous 20 years, the Army and the other Services had dismantled their capability to produce tactical imagery at lower levels. Instead, the Army chose to capitalize on electronically generated imagery products from corps to divisions. Called secondary dissemination, this method replaced the familiar aerial exploitation units in divisions and corps. Rather than tactical units developing their own negatives for study on a light table, photographs would be analyzed at a higher level, converted to digital data, and transmitted to the using units for reassembly at special terminals. Much like a closed-circuit video relay of the pictures, such links were still largely incomplete. Now, on the eve of war, off-the-shelf purchases and prototypes had to be fielded because transmission of digital data required bandwidths well beyond those of the standard communications net allocated to intelligence.

Four separate satellites were used to transmit imagery. An AIA-to-ARCENT satellite link transmitted imagery directly to ARCENT. Starting on August 14, an Army Space Programs Office satellite and a borrowed Navy navigation satellite transmitted more than 30,000 images to XVIII Airborne Corps. XVIII Airborne Corps linked its organic satellite capability—the TENCAP Imagery Exploitation System at Fort Bragg—with its forward units using prototype terminals equipped with TENCAP-compatible radios. Prior to deployment from Europe and

throughout Desert Shield and Storm, VII Corps received imagery transmitted by XVIII Airborne Corps via tactical terminals. Once deployed, another secondary imagery dissemination was developed and fielded in three weeks to pass imagery to VII Corps and subordinate divisions. To provide a redundant imagery transmission capability to all forward units, a team under Major John Healy from the Intelligence Center and School forged the fourth satellite link to the forward corps and divisions using the TROJAN satellite for secure voice and digital imagery transmission. [15]

Getting new equipment fielded in time was a close-run race, one that in some cases was completed too late. TROJAN, while proposed for deployment on November 7, did not get to the theater until February. A G2 team designed, built, and readied 12 trailer-mounted TROJAN terminals, and on February 8, the ARCENT G2 laid out a program to field TROJAN. Units about to receive TROJAN terminals still had to be trained on a system that functioned much like electronic mail, facsimile machine, and telephone all in one. Once in place, TROJAN was the principal channel for transmitting templates. Civilian contractors did not complete the 1st Infantry Division's 72 hours of training until the day before the ground war began.[16]

Even with the best efforts of those dedicated to solving the dissemination problem electronically, moving imagery and other intelligence products forward required enormous manpower. Tactical commanders, faced with a looming ground war, needed the intelligence immediately, not when TROJAN was in place. Meanwhile the Joint Imagery Processing Center began operation in mid-January—just in time to handle the increased load of U-2 and RF-4C imagery that began to flood in once the air war began. The answer to getting the material forward was manual courier. Throughout January and February, daily couriers carried 200 pounds of annotated photos, maps overprinted with Iraqi templates, and other intelligence documents, moving 27 tons of material from one end of the theater to the other. Despite their efforts, the system was less than ideal and division commanders remained frustrated. The information was available, but tactical commanders had enormous difficulties getting their hands on it. Generals Rhame and Griffith dispatched their intelligence officers daily to the rear to collect the most recent templates, imagery, or other appropriate documents. Once their units began to move, the problem was compounded as units tried to get updates en route. Frustrations crossed corps boundaries as collection efforts gave priority to the main attack by VII Corps, leaving fewer systems available to support XVIII Airborne Corps. Generals Peay and McCaffrey grew especially concerned with the continued lack of surveillance of the western KTO. Their fears were understandable, but they remained unresolved.

Intelligence fixes were not restricted to machines. One of the most important was an Army intelligence initiative to recruit, train, and deploy Kuwaitis to the theater as linguists in intelligence units. At the initiative of General Eichelberger, nearly 300 Kuwaiti volunteers—mainly college students in the United States—came into theater under this program as sergeants in the Kuwaiti Army. National military intelligence support teams from the DIA provided a direct link from each corps and ARCENT to the national intelligence community, complete with their own data and imagery transmission capabilities.[17] Additionally, intelligence information was shared liberally among the Coalition allies. Access to sensitive material, particularly US overhead imagery, impressed French and other allied leaders for its quality and accuracy.

The mastermind behind this effort was the ARCENT G2, Brigadier General John Stewart, Jr. Dual-hatted when the crisis began as the ARSTAF assistant deputy chief of staff for intelligence and the AIA commander, Stewart was totally immersed in the intelligence effort supporting the theater, personally supervising the intelligence picture presented to the Army's leadership. Stewart demanded excellence from his subordinates; his daily staff calls were an intense and sometimes painful experience for the ill-prepared. Once the decision was made to augment the DIA with Service intelligence to form a DOD Joint Intelligence Center, Stewart manned the JIC with Army intelligence professionals from the Intelligence and Threat Analysis Center. Meanwhile in the theater, XVIII Airborne Corps pushed ARCENT and CENTCOM planners to war-game and provide predictive intelligence and to focus on how to disseminate intelligence to ground units.

In late December, General Vuono personally ordered Stewart's transfer to the theater as ARCENT G2 to develop an intelligence operation capable of supporting Army-level offensive operations. Stewart was clearly the right man for the job. He was dedicated to supporting the tactical commander, and he took over a staff that was doubling in size even as it shifted to offensive planning. As Stewart would later recount, "The leadership challenge during this period was to instill a sense of immediate urgency in the entire G2 staff. We did that, but not without concern and a little pain."[18]

Stewart's other mission was to build confidence and trust within the corps and divisions that ARCENT G2 would deliver the needed intelligence on time. The operations order kicking off the ground attack would be enough to move the units into Iraq. From that point forward, the corps commanders, especially General Franks, would call "audibles" based on Iraqi reactions. Anticipating that requirement, ARCENT planners worked up a series of concept plans based on probable Iraqi moves. Stewart promised the commanders that as they reached these major decision points in the ground battle, he would provide the intelligence assessments

necessary to select the right concept plan. To achieve that end, Stewart planned intelligence collection, production, and dissemination to mesh with the needs of the corps commanders. Early on, Franks and Stewart met to synchronize the critical decision points in the fight, particularly the read on RGFC actions that would enable Franks to decide whether to continue northeast or turn to the right. The result was an intelligence and electronic warfare synchronization matrix that, with the commanders' decision points as its foundation, would produce useful, predictive tactical intelligence. Those "key reads" would be the ultimate proof of the ability of Army intelligence to support the commander fighting the ground battle.

THE AIR OPERATION: A CLASH OF CULTURES

Preparing for the ground battle brought to the forefront longstanding cultural differences between the Air Force and the Army, differences that had begun to emerge as early as August. The two Services' operating environments are fundamentally different. Air Force doctrine rests on the principles of centralized control and flexible execution. Air Force planners regard anything more specific than that as the "bag of tricks" necessary to accomplish the mission—what the Army refers to as tactics, techniques, and procedures. The Air Force therefore is able to change its tactics, techniques, and procedures very rapidly without any effect on its doctrine. This general view of doctrine allows the Air Force to accommodate last-minute proclivities in a campaign by capitalizing on the flexibility of its principal operational element—the aircraft. While an Air Force operation might consist of, at most, several hundred distinct combat elements, all of which are relatively easy to schedule, observe, and direct, the Army's operational elements consist of hundreds of thousands of individual soldiers and units, widely scattered and tucked within terrain folds and foliage. The essence of joint operations is full synchronization and integration of combat power. This means that all Services must approach the battlefield from the same perspective, with each complementing the other in achieving the commander's goal. When Army commanders select specific tactics, techniques, and procedures to accomplish a mission, they do so guided by doctrinal principles. Joint doctrine allows for joint control while maintaining appropriate flexibility in execution.

The 31 initiatives dialogue of 1984 led the Army to expect the Air Force to comply with the mutually accepted agreements on battlefield air interdiction. The difference between air interdiction and BAI is critical. Whereas AI reaches deep to strike strategic targets approved by the CINC, BAI attacks targets nominated by corps commanders that are closer to ground tactical units. BAI provides one of the most powerful means for the corps commander to shape the deep battlefield. AirLand Battle doctrine relies on the premise that some discrete portion of ground attack air

power would be directed to kill or at least to hold distant enemy formations in place long enough for ground forces to maneuver against them. The process of deep attack involves much more than just indiscriminate strikes by tactical aircraft at any lucrative object located in front of friendly forces. Instead, the commander carefully focuses his limited air power on the targets most critical to the maneuver. In the offense, the corps commander chooses his axes of advance and then carefully calculates time and distance to determine which enemy forces arrayed deep against him threaten his advancing columns.

The integration and synchronization of combat power to strike deep, high-value targets creates synergism. For example, the culminating ground operation of Desert Storm required that Iraqi chemical delivery systems, especially artillery, be destroyed. Equally essential, the Republican Guard would be battered, cut off from higher headquarters, and fixed in place until VII Corps could smash through its defenses. Early attacks on forward command and control systems would prevent alerting the RGFC to the direction and size of the main attack. By targeting just those threats, Franks sought to "shape" the battlefield to facilitate the movement of his own forces. Hitting those targets simultaneously as ground forces destroyed frontline divisions might collapse the Iraqi defense of the KTO.

The function of BAI, therefore, is not only to attrit the enemy but, more importantly, to take away his freedom of maneuver, his capability to sustain himself, and his will to resist in order to shape the battlefield for the decisive maneuver. Since BAI was most essential to Generals Luck and Franks for shaping the battlefield for the coming ground operation, its availability was crucial, and they trusted that it would be available. To support their schemes of maneuver, the corps commanders wanted to be able to direct air attacks against the most important targets beyond the reach of their organic attack systems. The issue was not how much of the total air effort was devoted to shaping the battlefield; the Army recognized competing priorities such as air-to-air and air interdiction of deep theater targets. The issue was that corps commanders needed to control the effects and timing of BAI targeted within their zone. Placing BAI under an overall category of interdiction reduced the corps commander's influence on the process.

THE INTERDEPENDENCE OF AIR-GROUND OPERATIONS

Air planners have long sought to vindicate the view that the ever-increasing accuracy of air-delivered munitions has made it possible to win wars the "clean" way—through strategic targeting. In this view, the application of air power then becomes a campaign—if not a separate war—distinct from ground combat. The Army, on the other hand, does

not recognize the distinction. Instead, ground commanders see air power as the means to weaken the enemy and shape the battlefield. Desert Storm once again surfaced this fundamental difference.

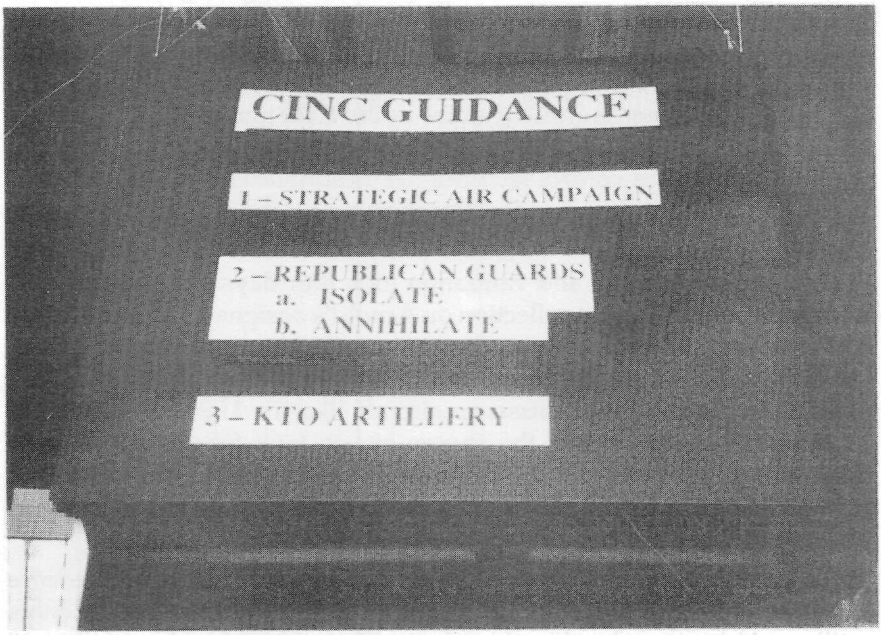
In early August, Checkmate, a special Air cell under the Air Force Chief of Staff, asked Colonel Thomas Leavitt, chief of the Operations and Contingency Plans Division with Department of the Army's Directorate of Operations and Mobilization in the Pentagon, for an informal Army review of a contingency plan for offensive air operations against Iraq. Leavitt pulled in two members from the Crisis Action Team—Major Dan Farley, one of his Middle East planners, and Major Tom Odom, the Middle East current intelligence officer for the ARSTAF. Leavitt told the two, "There's an Air Force organization called Checkmate working a compartmented air operations plan against targets in Iraq. They've asked for low-level Army assistance. Go down, find out what they want, and give them what you can. Keep this close hold."[19] In Checkmate, Farley and Odom joined a small planning cell of colonels headed by a brigadier general. The planners briefed the concept—a strategic "takedown" of Iraq to be completed in a week that would force Saddam to withdraw his forces from Kuwait. The Checkmate plan had no provision to target the Iraqi forces poised on the Saudi border. Dubbed "Instant Thunder," it became the basic plan for air operations in Desert Storm. Although, at the direction of the Chairman, JCS, and the Secretary of Defense, the air planners soon modified it to include targets in the KTO, some Air Force planners continued to believe that victory was achievable through air power alone. The Army, in contrast, remained convinced that ground and air power applied in synergy would be necessary to eject Saddam from Kuwait.

THE CINC'S VISION

On January 15 Schwarzkopf visited his air planners at the Tactical Air Command Center for final discussions before the war. It was not a pleasant experience. General Horner laid out his plans for a phased, sequential operation beginning with strategic air attacks, followed by the establishment of air supremacy, attacks on the Republican Guard, and finally, attacks on the forward defenses of the KTO.

Schwarzkopf grew increasingly angry as Horner briefed the *sequential* nature of the air plan. Fearing that the shooting war might end prematurely, the CINC wanted a *simultaneous* campaign. He wanted to hurt Saddam's military power across the board so that should Saddam withdraw from Kuwait, at least a portion of his Army would be crippled by air power. Schwarzkopf wanted the KTO and the Republican Guard to be hit from the beginning of the operation—a major change just two days before the operation was to begin. It was only the first of a series of last-minute changes.

Horner held daily targeting meetings with Schulte and other component representatives.



Schwarzkopf's guidance to Horner was posted in CENTAF's "black hole," the restricted access targeting center.

As JFACC, Horner faced an enormous challenge in mounting the air operation against Saddam. Once the operation began, he would juggle three days of events simultaneously: the air attacks that day, the creation of an air tasking order (ATO) for operations the next day, and the formulation of a 48-hour advance military attack plan. The most visible symbol of that challenge was the daily ATO, a 300-page document that directed the planning and packaging for strikes of more than 1,200 land-based fighters, fighter-bombers, and bombers in addition to sea-based aircraft, support aircraft, and rotary-wing aircraft. Dissemination of this huge daily document proved enormously difficult. When division air liaison officers did not receive the ATO, they had no idea whether targets nominated by their division were attacked or what aircraft were scheduled to operate in their area. The air power assembled in Saudi Arabia was comparable to the largest airline in the world, flying in a fraction of the globe's airspace, with Horner as its president in charge of scheduling. Managing the flow of the air armada would be tricky, so early on Horner decided to keep it as simple as possible. Targeteers would have only two categories of offensive air available: air interdiction and close air support. BAI went by the wayside.

THE TARGETING CONTROVERSY

Meanwhile, ARCENT and the subordinate corps also prepared for the beginning of the war, concentrating on the targeting issue. Under Yeosock's broad guidance, Generals Arnold and Stewart worked out the targeting procedures to shape the battlefield. Their goal was an expansion on the early planning imperative to destroy 50 percent of the Iraqi artillery, armor, and mechanized systems in the KTO and at least 90 percent of the artillery capable of reaching the breach areas. Targeting priorities were command and control facilities like headquarters and communications sites; artillery; tanks and armored vehicles; and logistics, including supply dumps, maintenance locations, and refueling points.

Target development and validation took four days. On day one, Stewart focused intelligence collection on Arnold's designated priority target areas. Using these priorities, Stewart's collection management team tasked specific systems to target designated areas. Nationally controlled systems or theater reconnaissance aircraft like the U-2 and the RF-4C Phantom II would overfly the chosen site to look for suitable targets. Electronic intelligence (ELINT) disclosed unit locations that could be further refined through airborne direction-finding using ARCENT and the corps aerial exploitation battalions.

The same battalions tracked enemy radars, revealing air defense locations and target-acquisition batteries to support Saddam's formidable artillery. Airborne radars like those in the TR-1, the Mohawk, and JSTARS also folded into the collection effort. The Mohawk's side-looking radar

gave moving target indications that were used to tip off other systems like JSTARS. Human intelligence sources also played a growing role. As more enemy deserters came across the lines, their debriefings were used in targeting.

On day two of the targeting cycle, Stewart's people reviewed the input from the collection effort, then developed potential targets and loaded them into the data base for use in the ATO. To make the cut, targets had to be located to within 100 meters. Stewart used the list on day three to identify high-value targets. He and Arnold then prioritized those targets in accordance with the commander's guidance. Meanwhile, Stewart again tasked the collection system to confirm that the targets were still there. Day four continued the validation and refinement process until the targets were struck.

Target validation and revalidation were enormously important. The Air Force required that targets be revalidated eight and then again four hours prior to attack. Given an average of 110 ARCENT-submitted targets per day and the size of the area, managing the effort to revisit each target was an almost impossible task. The accuracy requirement only increased the difficulty. Targeteers joked that they had to supply target folders with a picture clearly marked "Place bomb here!"[20] Only satellites, RF-4Cs, U-2s, TR-1s, Tornados, and UAVs were capable of meeting the required 100-meter accuracy. Only 24 RF-4Cs, 5 TR-1s, and 6 U-2s were in theater, and only VII Corps had access to UAVs. With the Iraqis observing strict radio silence and remaining static in XVIII Airborne Corps' sector, Luck's only recourse to verify targets was long-range surveillance which he was precluded from inserting until one week prior to the ground offensive. Six of the RF-4Cs were in Turkey and were largely unavailable for Stewart's needs. The same systems were already heavily tasked for other collection requirements. To make matters worse, the Air Force shaved its own reconnaissance requirements off the top to support the strategic bombing effort. RF-4C missions so diverted were not offered up to the Army as part of the available pie at the theater reconnaissance meeting. This practice continued until it was brought to the attention of General Waller, the deputy CINC, on February 7.[21]

Despite the best efforts of Stewart's target team, ARCENT could not reconfirm the nominated targets within the prescribed time. To ease this difficulty, ARCENT liaison teams at CENTAF received target lists that could be piggybacked against CENTCOM-directed TR-1 missions providing real-time intelligence data to Air Force hunter-killer teams of F-16s, A-10s, and F-15Es. Similar measures were established for JSTARS. Ultimately, Stewart's targeteers arrived at an 18-hour window for target validation, processing 70 percent of the targets within that time.

Even as Arnold and Stewart solved the timing problem, a more critical issue arose in the air operation. After intensively managing the targeting process, Stewart and Arnold found that less than half of their requested targets made it to the ATO. The result was an immediate outcry from the corps commanders who, having lost their ability to designate BAI targets, still expected to influence the general interdiction effort to conform with corps plans to shape the battlefield. The number of corps-nominated targets actually flown quickly became the litmus test for air support. As far as Luck and Franks were concerned, the issue was critical. [22]

The view of commanders at ARCENT and below did not match that of the CINC. Luck and Franks timed their plan to shape the battlefield in relation to G-Day, the first day of ground operations. Both commanders wanted seven days of sustained air attacks directed at Iraqi units in their path of advance, but they were in the dark as to exactly when G-Day would occur. Consequently, in January, at the very beginning of the air operation, the corps commanders began submitting target nominations that would allow them to shape the battlefield from south to north. When the Air Force did not immediately strike those targets, the outcry equaled that over the loss of BAI. Attempting to close the communications gap, Arnold briefed the CINC on ARCENT targeting concerns on January 26. Schwarzkopf rejected the brief as a purely ARCENT view.

As for the Air Force, General Horner was reacting to the CINC's demands. As the JFACC, Horner saw the CINC daily—and Schwarzkopf was definitely talking to him. Once the air operation began, Schwarzkopf put his personal stamp on the ATO by redirecting the targeting at the eleventh hour. On occasion he would wait until after the ATO for the next day was ready to pick a specific Republican Guard division at the 1900-hour meeting. Such late changes could adversely affect targeting, and as a minimum caused delays.

THE ROLE OF THE LAND COMPONENT COMMANDER

The next effort to ease the conflict over targeting came 10 days into the air operation with the first meeting of the CENTCOM Joint Targeting Board. The meeting resulted largely from the efforts of Colonel David Schulte, chief of ARCENT's battlefield coordination element. By doctrine the LCC's representative, the BCE served instead as the ARCENT's interface with Horner's staff, making it one of several competing voices in the daily targeting meetings. As the BCE chief, Schulte did not have daily access to the CINC's briefings where Schwarzkopf would often issue guidance directly to Horner.

General Waller was aware of the friction between the Air Force and the Army but was uncertain of the cause or the significance. Schulte had served with Waller on two previous assignments, and because Waller trusted his judgment, he told Schulte to evaluate the situation. In

behind-the-scenes talks, Schulte explained ARCENT's frustrations with the process, convincing Waller to take up the issue with the CINC. As a result, Waller convinced Schwarzkopf to appoint him head of the Joint Targeting Board with full authority to review the daily ATO. The change was at best a partial solution, for while it did allow the Army more say in the process, the CINC continued to make last-minute changes to targeting.

ARCENT was ill-equipped to handle those changes. Schwarzkopf's decision cycle was often inside that of the targeting effort. The result at ARCENT and below was frustration, particularly among targeteers forced to scramble to come up with new targets based on old data that often proved wrong. Ultimately, Stewart built a target data base on all the Iraqi units, regardless of their priority in the eyes of the corps commanders, to ensure that targets were available when such last-minute changes were made.

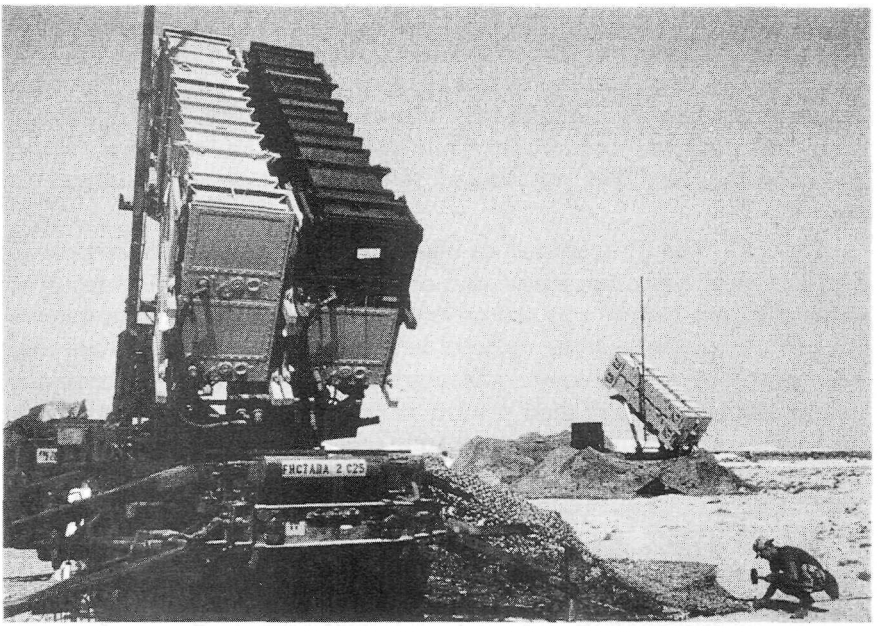
The eleventh-hour changes also affected the air operation, particularly in its earlier stages when dumb bombs were the main weapon being used against ground forces. Horner's F-16 pilots used Stewart's six-digit locations to set their inertial guidance systems to fly to the targets, only to find nothing and then divert to secondary targets less important to corps commanders' desires. Even if the target was only 1,000 meters away, the pilots could not see it from 25,000 feet and would often complain about poor targeting during debriefs. Horner, chastened by Schwarzkopf about poor results, reacted by changing his techniques in managing the operation. Already fundamentally flawed, the targeting effort soon faced additional challenges. The first came from Iraq.

THE SCUD WAR

In a typical act of defiance in December, Saddam test-fired three of his Scuds at targets inside Iraq. While the launches did not threaten the Coalition or Israel, they did heighten tension. Fortunately the firings also allowed US Space Command to tweak its detection systems and to improve warning times to the theater. Nevertheless, the firings were a clear warning that Saddam would use the weapons if attacked. On January 18, in retaliation for Coalition air attacks, he launched the first of 86 modified Scuds against Israel and Saudi Arabia. The next day eight missiles fell on Israel, injuring 47 people and causing extensive damage to civilian property.

Patriot Defense

The 11th ADA Brigade was responsible for air defense of Saudi ports and airfields. Each corps had its own organic air defense units. Colonel Joseph Garrett, the 11th ADA commander, coordinated all of these forces and integrated them with the Coalition air and air defense forces. Garrett



Patriot firing batteries were positioned to defend Dhahran.

established a network of command and control centers to link the deployed battalions, allowing them instantaneous access to the latest operational and intelligence picture.

On the night of January 20, A and B Batteries, 2-7th Patriot, were on alert for more of Saddam's Scud attacks. Space Command's missile warning satellites and radars had broadcast an alert over the CENTCOM warning net just minutes before, prompting the B Battery tactical control officer to blow a warning siren and place his launchers under computer control. The battery crew immediately donned chemical gear and took shelter as the computer announced it was engaging an incoming missile. Next door, the adjacent battery was similarly engaged as the battalion computer coordinated the action between the two batteries. Far above, Iraqi Scuds began their dive into the atmosphere at more than 5,000 miles per hour, and as the air thickened, they began to buffet. Slowed to 4,400 miles per hour by the increasingly dense air, the missiles began to break apart. Below, Patriot launchers boomed, spitting two missiles out of the canisters for every Scud. In moments, the sound of the missiles breaking the sound barrier announced that they had achieved their maximum speed of 3,700 miles per hour. Scuds and Patriots now closed at more than 8,000 miles per hour. In a climactic vision of flame and sound, the engagements ended in seconds as three of four Scuds launched at Dhahran were

intercepted. The fourth missed the city completely. Later, crews would dub this evening "the night of a thousand Scuds." The Dhahran batteries had fired 8 Patriots and those at Riyadh had fired more than 30. The high expenditure rate soon raised concerns that the supply of Patriots might run short despite the best efforts of Raytheon and the Patriot program manager's office.

The very crudeness of Saddam's modified Scuds increased the Patriot's challenge. The PAC-2 version was designed to counter a more advanced tactical ballistic missile whose performance parameters could be predicted. Instead, the Patriot had to intercept an incoming missile that often was in the process of breaking up. Hitting the incoming missiles as they wobbled and weaved was complicated by the debris from disintegrating missiles. Because the missiles in effect created their own decoys, tactical control officers at each firing battery had to learn the art of picking out the heavier warheads as they fell away from the missile debris. Eleven software improvements had been necessary to give the Patriot an antitactical ballistic missile capability. Contractors who accompanied the first Patriot batteries that arrived in Saudi Arabia in mid-August and stayed with them throughout the crisis refined the software so that the computer could better distinguish warheads from debris. The teamwork paid off as these units continued to engage Saddam's Scuds.

The success that American Patriot batteries had defending Saudi Arabia raised eyebrows in Israel. Although Israel had bought its own Patriots, the crews were still in training at the US Army Air Defense School in Fort Bliss, Texas, when the war began.[23] The Israeli government had rejected an offer of American-manned Patriots to fill the void. However, with Saddam's missiles landing in his country, Israeli Defense Minister Moshe Arens called Secretary of Defense Cheney and accepted the offer. Following Cheney's conversation with Arens, President Bush phoned Prime Minister Shamir and promised to do all he could to prevent further attacks on Israel, persuading the Israeli leader to wait rather than retaliate.[24] Fewer than 27 hours later, Colonel David Heebner's 10th Air Defense Brigade from Darmstadt, Germany, was positioning two of its batteries in Israel. The brigade had not trained for a deployment outside Europe but reacted quickly, assisted by the 32d Air Defense Command. Using a combination of US Air Force and El Al aircraft, the units began arriving on January 19. They were fully operational in three days, just in time to take on Saddam's next volley.[25] The Patriot tactical missile had served as a key political tool to keep Israel out of the war. But Patriots were purely defensive and the United States had to do more than just parry Saddam's blows.

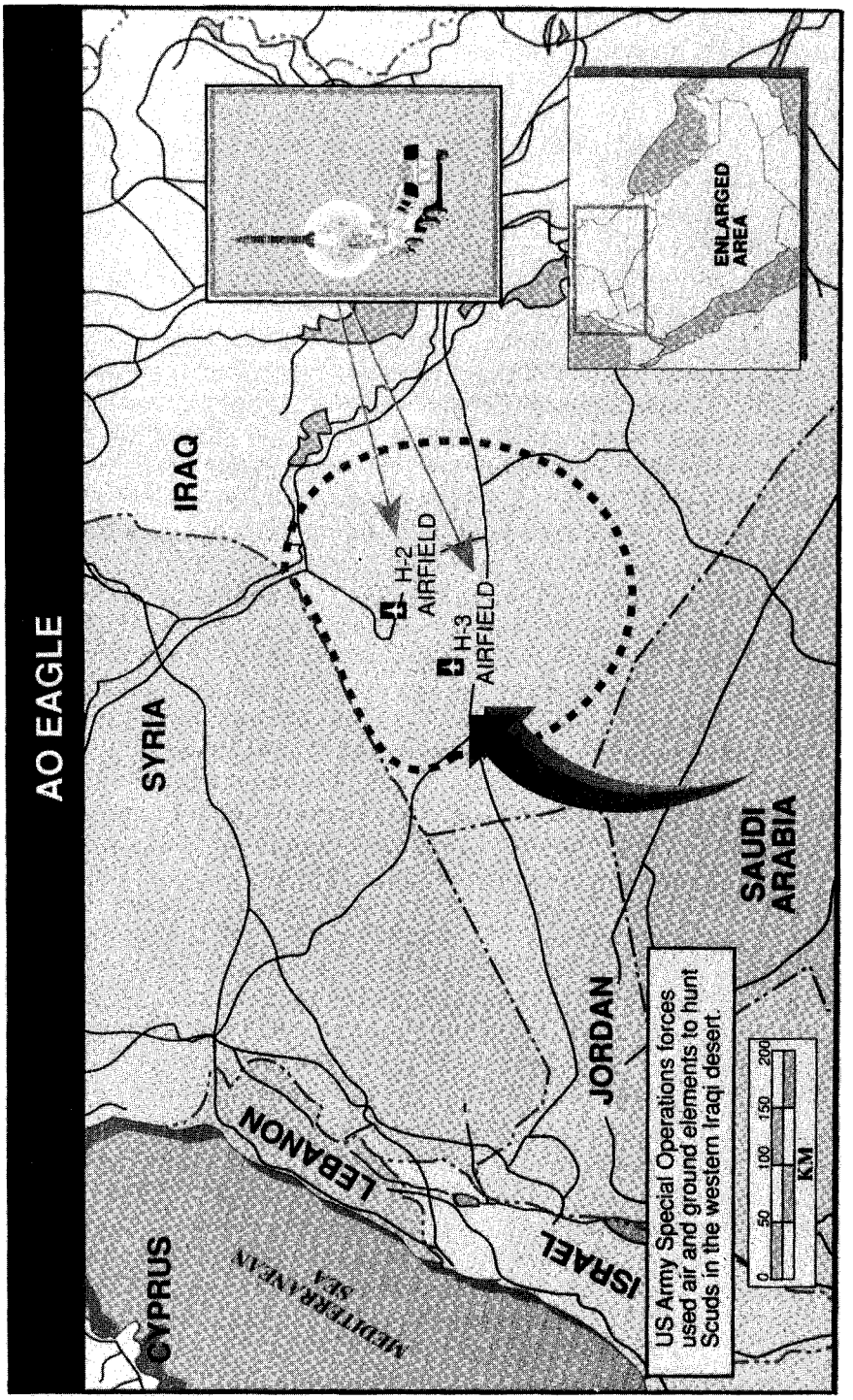
The Hunt for Saddam's Scuds

The key to ending the Scud threat was to destroy the launchers. The fixed launch sites—all in western Iraq—were easy to target and relatively easy to put out of action. But Scuds were also launched from Soviet-made MAZ tractors or locally produced trucks and trailers. Loading a missile on its launcher and prepping it for firing could be done in hidden positions, allowing the crew to drive to a surveyed launch position, set up, and fire with minimum exposure. Intelligence looked hard for such sites, but the bottom line was that the Iraqis could launch the missiles from almost anywhere. They further complicated the problem by using decoy trucks with large pipes mounted to resemble missiles. Finding a Scud launcher under such circumstances was difficult at best.

Scuds quickly became CENTCOM's priority target and Horner redirected air sorties accordingly. By January 24 CENTCOM had diverted 40 percent of all air sorties to Scud hunting at a considerable cost to ARCENT's efforts to prepare the battlefield. General Leide used JSTARS to find Scuds on the road. National intelligence agencies focused on suspected launch areas and targeted Iraqi strategic communications with available jammers.

One of the units targeting Saddam's Scuds was a newly formed platoon in the 201st MI Battalion, the 513th MI Brigade's electronic warfare component. Captain Eric Kennedy, A Company commander, had formed the platoon by pulling soldiers from other duties to man the TLQ-17, a high-frequency jammer, known as the "Sandcrab." First Lieutenant Brian O'Neil, Kennedy's former executive officer and now Sandcrab platoon leader, selected volunteers with previous experience on earlier versions of the TLQ-17, a system normally used against tactical VHF communications. With an antenna 320 feet long, 300 feet wide, and 60 feet high, the Sandcrab was anything but mobile. The antenna boosted the jammer's power to almost 5,000 watts, making it ideal for detecting long-range, high-frequency communications used to control Scud launches. Operating from three remote bases named Tombstone, Broken Axle, and Mesa, O'Neil's "Sandcrabbers" were especially effective in driving the Iraqis into less secure communications that were vulnerable to interception.[26] Chief Warrant Officer James Roberts, assigned to the 525th MI Brigade, combined the data from the Sandcrab with other signals intelligence—including TENCAP and tactical systems—to develop a comprehensive scheme for targeting Scuds. This scheme proved to be more accurate than existing theater or national methods, and was subsequently adopted by ARCENT as the primary means for verifying Scud targets.

To find and kill Scuds, US Special Operations Command created a special 877-man Joint Special Operations Task Force (JSOTF) of aviation


AO EAGLE
SYRIA
IRAQ
H-2 AIRFIELD
H-3 AIRFIELD
ENLARGED AREA
CYPRUS
MEDITERRANEAN SEA
LEBANON
ISRAEL
JORDAN
SAUDI ARABIA
US Army Special Operations forces used air and ground elements to hunt Scuds in the western Iraqi desert.
0 50 100 150 200
KM

and ground forces and placed them directly under CENTCOM control working with British special forces. JSOTF planners focused their search for the launchers near Scud support facilities around the fixed launcher complexes at H2 and H3 airfields in western Iraq, some 75 kilometers from the Jordanian border, and in the vicinity of al Qa'im on the Syrian border. Saddam had scattered his Scud support over a huge area to hide and secure it, so the JSOTF area of operations, AO Eagle, was likewise extended over several hundred square miles.

Beginning on February 7, Special Operations forces infiltrated deep into Iraq to destroy communication sites, ambush mobile launchers, and direct armed helicopter strikes against fixed facilities associated with Scud launchings. In one instance, a reinforced Ranger platoon carried in Special Operations helicopters raided a strategic communications facility near the Jordanian border. The Rangers toppled the 350-foot microwave tower, destroyed the communications site, and returned safely to base.

Combining the eyes of Special Forces soldiers on the ground with Air Force firepower proved most effective. In the early morning hours of February 21, a Special Forces reconnaissance team deep in Iraq spotted an Iraqi convoy almost a mile from their hide position using night vision devices. The team verified their own position using a Global Positioning System and determined the exact map spot of the target with a hand-held laser range finder. The team's powerful lightweight transmitter broadcast the air support request more than 200 miles. Within minutes, an F-15E Strike Eagle was on the way, vectored into the target area by AWACS. Effective antiaircraft fire disrupted the first pilot's attack, however, and he missed the target. Still determined, the SF team called in a second F-15E to destroy the target. This Strike Eagle did not miss and the team observed the convoy disappear in a huge fireball followed by several secondary explosions. Meanwhile, the first F-15E pilot used his on-board radar to locate more Scud support vehicles, and AWACS continued to shuttle in additional F-15Es until all the Iraqi vehicles were destroyed. To be safe, the ground SF team moved to a new hide site to radio each battle damage assessment (BDA) to al Jauf. Even after the raids were completed, the enemy apparently never realized that they were being watched from the ground.

Faced with such an absolute effort, the Scud attacks dropped dramatically in frequency and accuracy. Of the 86 Scuds launched, Baghdad fired almost half from western Iraq. During the 20 days from January 18 to February 6, the Iraqis launched 29 Scuds from the western desert. As key support facilities were destroyed, the Iraqis were forced to hip-shoot their missiles. In the next 22 days, Iraq launched only 11 missiles and 2 of those fell harmlessly in the open desert.

The effort to blunt Saddam's Scud threat succeeded, but at a price. The diversion of air power to fly Scud combat air patrols and the intelligence to support counter-Scud operations directly impeded the effort against Iraqi ground forces in the KTO. Scud busting extended the air effort by more than a week. Ultimately, the Scud hunt meant that ARCENT targeting goals would not be reached before the beginning of the ground war.

MEASURING PROGRESS AND MAKING ADJUSTMENTS

Battle damage assessment provided the daily measure of progress toward the ARCENT goals and had become a hot issue, only slightly less contentious than Scud hunting. ARCENT was the theater authority for the enemy ground situation, responsible for assessing damage done by allied bombing. The reasoning was simple: if the opening of the ground operation was contingent upon reaching a 50-percent attrition of Iraqi armor and artillery, the ground commander responsible for the main effort—General Yeosock—should make that call. [27]

Given that targeting was already a sensitive issue between ARCENT and CENTAF, BDA would inevitably become equally controversial. Assessing battle damage was much more art than science. Ideally, after every strike an imaging system, either RF-4C, U-2, or Tornado, would overfly the scene to determine effects. But with so many competing demands on the theater imagery system, BDA imagery ranked low in priority. Even imaged targets were hard to analyze because unless a tank or armored vehicle exploded catastrophically, determining if it had been hit at all was difficult.[28]

General Stewart developed a formula for estimating BDA: using armored vehicles and artillery as the baseline, he at first counted only 50 percent of A-10 pilot claims and all imagery-reported kills as confirmed. As the campaign progressed, the BDA cell in the ARCENT G2 modified the process to reduce the weight of A-10 claims from one-half to one-third and to accept only 50 percent of all F-111 and F-15E kills supported by gun video.[29]

Naturally, this procedure caused some concern, particularly with the tension between the Services over Army targeting. Air commanders felt that their pilots' successes were being discounted, perhaps in an attempt to force them to restrike targets in the KTO. Washington's concerns were just the opposite. Both the Defense Intelligence Agency and the Central Intelligence Agency were producing BDA reports based solely on their analyses. Lacking theater reconnaissance reports, the national BDA figures suggested that ARCENT was exaggerating Air Force successes. Later events would prove that Stewart was more correct than any of his critics.

The system remained controversial, but Stewart continued to broker the process, operating on the theory that if he angered both sides in the debate equally, perhaps the BDA was close to the mark. In any case, he was determined to give the ground commanders his best estimate on the damage to Iraqis regardless of its emotional impact. In one of his more contentious but correct calls, Stewart reassessed the attrition of the Republican Guard Tawakalna Division, adding to its strength after high-quality U-2 imagery showed many of its combat systems to be untouched.[30]

Meanwhile, the air operation and the targeting effort went on. Faced with disappointing results from less precise F-16 and B-52 strikes, especially against dug-in armor, Horner changed tactics on February 6 and turned to precision strikes with FB-111 and F-15E bombers. Frustrated by poor-quality target information, he pulled out of retirement the technique of fast forward air controller (fast FAC) used in Vietnam. At the height of that conflict, pilots with forward air controller experience in slower propeller-driven aircraft performed similar roles flying jets in the more lethal air defense environment over North Vietnam. Horner assigned each fast FAC a 30x30-mile kill box, easing the ARCENT targeting problem since target boxes were not tied to the ATO. The Air Force defined the kill boxes by latitude and longitude. Army planners further subdivided them and used the kill boxes instead of engagement areas, normally defined by geographic features. Targeteers helped select and orient kill boxes so that they included the most important Republican Guard and regular army heavy divisions. Using their Pave Tack sensors, FB-111s picked out the warmer vehicles inside each kill box, "plinking" them with laser-guided bombs. Later as U-2 H-camera imagery became available from the Joint Imagery Processing Center, Stewart's targeteers provided annotated imagery that gave six-digit coordinates for each target in the kill box. These kill arrays allowed FB-111 weapons officers to program in each target before takeoff, and results continued to improve.[31]

The kill box technique was not an unqualified success in the eyes of ground commanders. Although the technique generated lots of sorties, three problems emerged. First, the kill boxes were an Air Force control measure, meaning that selection of the target was the prerogative of squadron and aircraft commanders flying the missions rather than the supported ground commander. This situation in turn decentralized the targeting, making it difficult, if not impossible, for the ground commanders to find out which targets had been hit. Finally, the Air Force selected kill boxes based more on geometrical convenience than on the corps commander's scheme of maneuver. The boxes were not necessarily centered over the most menacing Iraqi defenses. The kill box concept worked as well as it did in practice because during the air operation the battlefield was almost completely static and there was plenty of time to be methodical and deliberate.[32]

On February 9, Secretary Cheney and General Powell were briefed on the progress of the air effort. Using ARCENT's BDA, the commanders told both men that 50 percent of Iraqi armor and artillery would be destroyed by February 21. With the goal of a February 21 G-Day, Horner's targeting of the KTO intensified, but friction continued. At the same time the Air Force increased the number of ARCENT targets flown on the ATO, it decreased the number of sorties flown against each target. This allowed the Air Force to meet the CINC's last-minute demand to maintain the number of air interdiction targets attacked without impinging on the strategic effort. Apprised by Colonel Schulte, General Waller intervened as he had in the matter of available RF-4 sorties.[33] During the war, ARCENT ultimately submitted 3,067 targets for the ATO; 1,241 were flown. Another 1,582 targets were submitted directly to Air Force targeteers or to the flying wings. These were flown as non-ATO targets, notably kill boxes and kill arrays.[34]

In contrast to the concern over BAI, Army ground commanders were pleased by Horner's plan for close air support for the ground operation. His innovative technique called for preplanned CAS, nicknamed "flow CAS" by CENTAF. With the number of aircraft at his disposal, Horner saw that the most efficient method of employing sorties to support the ground forces in contact with the enemy would be to push them forward at regular intervals. Under the control of the airborne command and control center (ABCCC)—the equivalent of a flying "tactical CP" for the Air Force—the sorties would check in with the air liaison officers (ALOs) at each corps to see if units on the ground had targets. If they had none, the CAS missions would divert to interdiction missions under ABCCC control. Horner's decision made sense and ground commanders saw that it would be inherently more responsive than keeping aircraft and crews on standby. Meanwhile, the air battle continued as the Coalition and the Iraqis took their first steps toward ground battle. The first came with the Iraqis' seizure of the Saudi border town of Khafji.

THE IRAQI ATTACK ON KHAFJI

Blinded by the Coalition's complete seizure of the air, Saddam's forces nervously awaited the beginning of the ground campaign. As early as January 22, ARCENT noted increased Iraqi patrolling along the front lines, particularly in the area north of Khafji.[35] This low-key activity continued until January 28 when the Marines reported the possibility of Iraqi remotely piloted vehicles flying over the border area.[36]

An alert analyst 7,000 miles away almost prevented the Iraqi effort at Khafji. On January 26, Chief Warrant Officer Donna Smith got a call on the Army side of the Joint Intelligence Center, buried in the bowels of the Pentagon. National intelligence had intercepted an Iraqi transmission that proposed a commanders' conference be held in the Iraqi 3d Corps sector

two hours after the intercept. Smith recognized a jewel when she saw one, and she quickly consulted an imagery technician to find a likely location for the conference. They frantically culled the imagery file on hand and found one very promising photo that showed a large building most likely to house a meeting of senior officers in the intercept area.

Smith, who quickly had the ARCENT shift leader in Riyadh on the phone, talked him through the circumstances of the hit while the imagery tech digitally transmitted the pictures. With just minutes to spare, Air Force targeteers found two FB-111s suitably armed and flying near the target area. The pilots punched in the new coordinates and were on the target in minutes. They overflew it once at higher altitude and confirmed the building was lighted at one end with a conspicuous number of military and civilian vehicles outside. Rolling in hot, the bombers plastered the target with 2,000-pound bombs. The next day reconnaissance systems confirmed that the building and the surrounding vehicles had been obliterated. Intelligence later learned that the 3d Corps commander was not at the meeting. Next to the ruins, however, the overhead picture showed an Iraqi helicopter on the ground, a strong indication that it was not a good day for someone important to Baghdad.

During the evening of January 29, the Iraqi 5th Mechanized Division, supported by elements of the Iraqi 1st Mechanized and 3d Armored Divisions, launched brigade- to battalion-size probes across the border into Saudi Arabia. Coalition forces quickly beat back an attack southwest of al-Wafrah by a brigade of armor. Confused and apparently lost, the brigade attempted to reenter Iraqi lines at the wrong point and was at least temporarily hung up in the obstacle belt. The second attack by an armored battalion, hit by Coalition missile and air attack as it cleared the lanes through the obstacles, quickly turned back as well. The third, a mechanized brigade, pushed south to the now abandoned Khafji, holding it briefly before being driven out by Coalition ground and air attacks. While the limited attacks occurred, elements from 1st Mechanized and the 3d Armored shifted forward to screen their withdrawal, acting as a covering force against any Coalition counterattack.[37] The action was a division-level reconnaissance-in-force. Possibly lured into the attack by an elaborate deception effort mounted by the XVIII Airborne Corps, Saddam, blinded and battered by the air operation, had hoped to preempt the Coalition ground operation, inflicting as many casualties as possible to embarrass the allies before withdrawing. While the XVIII Airborne Corps was actually in the process of moving to the west, corps and divisional deception teams had established an elaborate electronic and visual signature south of al-Wafrah about 30 kilometers from the border. Intended to mask the corps' movement and deceive the Iraqis into thinking its forward headquarters and units were moving into attack positions, the deception effort may have caused Saddam to jump the gun.

Khafji highlighted the difference in quality between Saddam's infantry and his regular heavy forces. The operation was complicated, involving heavy units from two corps and at least three divisions in a night passage-of-lines and subsequent attack. Coordination problems were evident as the units missed their passage points in returning. Movement times were slow and often delayed, allowing the Coalition to react more quickly. Khafji showed them incapable at this stage of the war of mounting an operational maneuver involving multiple divisions. On the other hand, it demonstrated that at least in the regular heavy forces the will to fight remained substantial. As an example of a coordinated military operation, Khafji was not pretty, but the Iraqis did execute the basic mission—under almost constant pounding by air, artillery, and occasional naval gunfire.

Taking that lesson to heart, General Franks keyed on the heavy units that formed the tactical reserve of the Iraqi 7th Corps, especially those that could threaten his open right flank as his units cleared the breach and drove north. The more quickly these Iraqi units could be destroyed—either by air or by the British 1st Armoured Division—the more quickly the remainder of VII Corps would be able to charge through on its way to the Republican Guard. Speaking to his targeteers, Franks slapped the map where armor was closest to the breach and said, "I want you to make that unit go away!"

With a single gesture Franks doomed the Iraqi 52d Armored Brigade, part of the 52d Armored Division, which soon became known among Air Force and Army targeteers as the "go-away brigade." The division's mission was to act as the tactical reserve to the Iraqi 7th Corps. The 52d Armored Division was to shift from its positions in support of the 26th Infantry to an area near al-Ethami.

The move was ill-timed. The 52d Brigade did not close on its new positions until January 12. With hand shovels and one backhoe, the brigade commander began the task of digging his tracks into the rocky soil. Two of the armored battalions were fully exposed when the air operation began; the third was dug in to an average depth of only one meter.

For the 52d, the shooting war began with the appearance of an A-10 at 1000 on January 17 and continued throughout the day, leaving 13 vehicles destroyed and 15 men dead. Already operating on a marginal supply system, the loss of transport—especially fuel tankers—would immobilize the unit's tracked vehicles for later destruction.

Coalition air attacks then turned on the brigade's armored vehicles. The unit lost an average of three to four tanks every day and the crews soon learned to stay away from their vehicles to stay alive. The BMPs

were the last category of vehicles to be struck in the final five days before the ground war. Attempts at decoying the attackers with burning tires proved marginally effective, at best delaying the destruction of the remaining tracks. After the hapless brigade commander reported his unit as 10 percent effective on February 21, a division inspector visited the unit to verify the report. Just as the inspection began, another A-10 arrived and proceeded to work over the remaining vehicles, leaving no doubt that the reports had been accurate. The brigade commander thought himself to be the unluckiest soldier in the Iraqi army. As he watched his unit crumble under an unrelenting aerial assault, he couldn't help but notice that the other two brigades of his division were sitting in the desert equally exposed but relatively untouched.

The division inspection led to a last-minute attempt to reconstitute the brigade. Drivers sent back to division to pick replacement vehicles on February 15 returned with 20 BMPs and one T-55. Despite the brigade commander's attempts to hide them alongside burning vehicles, at least three were smoking hulks by the end of the day. On G-Day none of the battalions had more than seven tanks left. The 75th fared the worst, with only 3 remaining of its original 22.

The brigade's personnel situation was no less disastrous. Another 300 troops deserted or failed to return from leave once the air attacks began. Some 35 soldiers were killed in the attacks and another 45 were wounded. With less than 10 percent of its tracked vehicles and some 500 beaten troops to begin the ground war, the 52d Armored had become the "go-away brigade" in fact as well as in name.

The destruction of the 52d Armored illustrates the synergy that can be achieved by targeting air power according to the corps commander's intent using BAI as discussed above. In this case, air power was used effectively to destroy a threat to the ground commander's plan of maneuver. The 52d was no longer capable of reinforcing the Iraqi forward defenses once the breaching operation began. Nor was the battered unit able to threaten Franks' right flank as VII Corps pushed through the breach toward the Republican Guard. A key element of Franks' operational design—shaping the battlefield with air power—had been achieved.

ARMY SUPPORT OF THE AIR OPERATION

Staff Sergeant Ronnie Wint and his two crew mates from A Battery, 1-27th Field Artillery, had spent the last six hours in their MLRS launcher fighting traffic along Tapline Road when their battery commander, Captain Jeff Lieb, radioed the mission to strike an Iraqi surface-to-air missile

site farther than 100 kilometers away. Wint's driver, Private First Class Russell Sullivan, quickly pulled out of the congested road and roared off cross-country to find the firing point and to exchange his two "six-pack" rocket pod containers for two pods each containing a new, as yet untried, tactical missile system. Five kilometers down the road, Wint's launcher pulled into the A Battery assembly area where the gunner, Sergeant Steve Hannah, quickly loaded the two missile pods. Wint then paused briefly at the survey control point pegged into the ground to update his on-board position-locating device and continued a short distance to the firing point. Once in position, Hannah punched target data into his fire control panel and completed the prelaunch sequence. It was now 1830 on January 17, the first day of the air operation.

The first ATACMS mission was to take down the al-Abraq SA-2 surface-to-air missile site located 30 kilometers inside Kuwait astride one of the key Air Force transit routes into the KTO. Once the mission was sent to Sergeant Wint's crew, both the ARCENT deep battle cell and the Air Force began the painful process of clearing a path for the missile. The Air Force had never had to contend with an Army missile that would climb so high to reach a target more than 100 kilometers distant. A corridor was

Staff Sergeant Wint, 1-27th Field Artillery, fired the first long-range precision tactical missile strike in history, January 18, 1991.

finally opened after midnight. At 0042 on January 18, the first shot that VII Corps had fired in anger since World War II also became the first precision strike by an Army missile in history. Two minutes after launch, the missile disgorged a thousand baseball-size bomblets directly over the Iraqi missile site with catastrophic effect.

COMBAT SEARCH AND RESCUE (CSAR)

As epitomized by Task Force Normandy and the ATACMS strike, Army elements were in the fight from the opening of the air operation. Conventional operations like the Apache raid on the Nukhayb radar site and Patriot Scud busting were spectacular and drew immediate attention. Others, like search and rescue, psychological operations, and the JSOTF Scud-hunting effort, operated in the shadows.

When an American aircraft went down over Iraqi-controlled territory, rescuing a surviving pilot before capture required fast action. Thanks to the CSAR effort mounted under the direction of Colonel Jesse Johnson at SOCCENT, some downed pilots were rescued. An example was the Army's rescue of an F-16 pilot on February 17. Engine failure caused his aircraft to crash 40 miles inside Iraq. The call came from the AWACs at 1815, and within minutes modified MH-60 Blackhawks from the 3-160th Aviation were in the air. By 2000 Chief Warrant Officer Thomas Montgomery located and picked up the pilot as enemy vehicles closed in on him. Seeing the enemy, Montgomery contacted the AWACS and requested support. Within minutes an F-16 was on station to destroy the enemy vehicles.

As in Montgomery's case, secretly infiltrating enemy territory, finding a downed pilot, and then racing back to friendly airspace was risky business. In the high-threat, Iraqi-controlled territory, Schwarzkopf firmly believed that he needed special crews to rescue downed pilots. Colonel Johnson got the mission more or less by default. With the consolidation of the Air Force's search-and-rescue helicopters under the control of US Special Operations Command, the Air Force was not resourced for the mission. Without dedicated, specially equipped helicopters, the Air Force had limited CSAR capability. The Navy faced similar limitations. Its rescue helicopters were fine for over-water missions, but Desert One proved that they were less well-suited for land operations. The Army had an organic capability to pick up its downed aviators, but it lacked the range for deep pickups unless it used Special Operations aircraft that had already been assigned to SOCOM. That left Johnson at SOCCENT to manage the missions under his centralized control. By default, Johnson assumed responsibility for CSAR in all of Iraq and Kuwait and for 12 nautical miles into the Gulf.

His was not a light responsibility. In deciding to launch a CSAR mission, Johnson had to judge whether to risk the lives of two crews to

save those of one or two men. He also had to determine if special aircraft were available. When such calls came, they usually went to Lieutenant Colonel Dell Dailey's 3-160th Aviation, whose aircraft were equipped for deep insertions and could serve in the CSAR role. During Desert Shield, Dailey had used volunteer pilots from the Air Force, Marines, and Navy to train his crews. Taking the "downed pilots" out into the Saudi desert, he would leave them for night recovery by his CSAR crews. This program not only proved valuable to his pilots, but served as a confidence builder for pilots involved in the air war.

Sometimes, however, conflicting missions prevented SOF aviators from accepting a CSAR mission. In one case, an Air Force F-16 pilot was shot down near Basrah. Although he suffered a broken leg, he managed to hide long enough to come up on the radio. When the CSAR request came into SOCCENT, Johnson had nothing available so he asked the other Services if they could pick up the pilot. The Army said yes.

Late on the afternoon of February 27, the 2-229th Attack from Fort Rucker, Alabama, serving with the 101st, received word that the F-16 pilot from the 363d Tactical Fighter Wing had been shot down near the causeway west of Basrah. The 2-229th was already operating in that area and had a UH-60L standing strip alert as a rescue aircraft for the unit's Apaches. Agreeing to take the CSAR mission, the battalion launched the UH-60 with two AH-64 escorts. A pathfinder team and a medical team led by Major Rhonda Cornum were on board the Blackhawk. General Luck tried to abort the mission from his tactical command post, knowing that whatever shot down the F-16 was equally capable of downing a Blackhawk, but he was unable to reach the unit in time. As it launched, an Air Force AWACs took over its control and directed it on a straight vector to the downed pilot's last known position. That vector put the low-flying Blackhawk directly over a concentration of armor and infantry, probably belonging to the Republican Guard al-Faw Infantry Division. The Iraqis shot down the Blackhawk, which crashed almost directly into their position at about 130 knots and disintegrated. Having been damaged by friendly fire, both AH-64s returned to base. Dust storms precluded another attempt to locate the Blackhawk until March 1 when the recovery team found five soldiers' remains at the crash site. Cornum, Staff Sergeant Daniel Stamaris, and Specialist Troy Dunlap had been taken prisoner.

The results of CSAR were mixed. Although initial estimates had predicted that 40 aircraft would be lost on the opening night of the air war, only three losses occurred. During the entire air and ground war the Coalition lost only 52 aircraft. Twenty-two pilots and crew survived: 14 were captured immediately and 8 evaded capture—2 for more than 24 hours. Of seven CSAR missions launched, three were successful. Each of the Service's special operations aviation units was credited with one recovery.

WINNING THE PSYCHOLOGICAL BATTLE

The psychological operations campaign was another Special Operations success, one of the most important of the Gulf War. As part of an overall campaign plan, PSYOP, or propaganda, can be a combat multiplier if the circumstances surrounding its employment are favorable. Saddam began waging his own PSYOP campaign early in the Gulf War as Baghdad Betty's broadcasts entertained American soldiers along the border each night. Some broadcasts were more amusing than others: one warned the troops that Robert Redford, Sean Penn, and Bart Simpson were seducing their wives back home. With such inept input, Saddam's propaganda created more support than disruption for the Coalition.

Managing CENTCOM's PSYOP campaign fell to the US Army 4th Psychological Operations Group (POG), especially the 8th Psychological Operations Battalion. By late August, 10 people under Colonel Anthony Normand, commander of 4th POG, were in Saudi Arabia working out a comprehensive plan to use 117 themes to target Iraqi soldiers and civilians. Submitted to the JCS on September 20, the plan got lost in the swirl of competing actions. Although it was too late to execute the original time-phased plan, the Office of the Secretary of Defense approved most of the broad themes of the plan on December 14, 1990. A strong message from Schwarzkopf to the JCS questioning the continuous delays was the catalyst that broke the plan loose. [38]

To offset the delay in Washington, Normand worked on a Coalition plan using a cell of Saudis, Egyptians, Kuwaitis, and British. On November 28, the Voice of the Gulf began daily radio broadcasts and the 8th PSYOP Battalion worked up leaflets highlighting the world stance against Saddam. The 8th Psychological Operations Task Force and Normand's cell also produced a video, "Nations of the World Take A Stand," which was distributed worldwide and also smuggled into Iraq.

The expanding demands for PSYOP and the pull of planners to fill vacancies at ARCENT and elsewhere quickly overwhelmed 8th POTF. To fill the void, Colonel Layton Dunbar, Normand's successor, deployed his full headquarters to the theater. Under the operational control of CENTCOM, Dunbar used the OSD-approved themes to develop programs which stressed the superiority of Coalition forces over those of Iraq and the inequality between Republican Guard forces and regular Iraqi units. Headlining world support for offensive actions, it emphasized that Saddam was the cause of the crisis and sought to allay regional fears about the Coalition's respect for Arab culture and private property.[39] The Voice of the Gulf broadcast in Arabic hammered home these messages to Saddam's troops 18 hours per day.

While the Voice of the Gulf filled the airwaves with its message, the Air Force filled the skies with leaflets, derisively called "bullshit bombs."

During the course of the war, the Air Force dropped 28 million leaflets over Kuwait and Iraq. The CINC himself recommended one of the most successful techniques employed in the campaign. MC-130 Combat Talons dropped leaflets on Iraqi units that identified the units by name and warned that they would soon be bombed. The leaflets suggested that the soldiers desert rather than risk their lives. That same night the B-52s would deliver on the promise. On many occasions, the MC-130s returned again to release more pamphlets saying "We told you to leave." The leaflets heightened the psychological effect of the B-52 bombings, especially among Iraqi troops along the Kuwait border. They lived in deplorable conditions and once the ground war started these pitiful soldiers surrendered quickly. Ninety-eight percent of captured prisoners had the leaflets in their possession. One Iraqi frontline commander reported the PSYOP campaign was "second only to allied bombing" in demoralizing his division. [40]

As the 8th POTF liaison officer to CENTAF, Army Major Jack Summe coordinated the leaflet drops with Air Force Brigadier General Buster Glosson's targeting cell. Summe was often received with disdain in the cell. Targeteers were always quick to chide him about his infamous leaflets. However, when reports filtered into CENTAF of thousands of Iraqis surrendering, opinion changed. When Jack Summe walked into the targeting cell on February 25, he received a standing ovation.

FINAL PREPARATIONS: THE G-DAY COUNTDOWN

Grimly, ARCENT and the subordinate corps along with the rest of the Coalition ground forces began a series of cross-border operations designed to further confuse the already dazed Iraqis. General Yeosock intended to reinforce the deception effort to further convince the Iraqis that the main effort would come directly from the south into Kuwait. CENTCOM dropped leaflets with Marine Corps emblems on Iraqi coastal units and pamphlets with VII Corps and XVIII Airborne Corps logos in Kuwait, far from the real location of these forces. Loudspeaker teams moved up to the border berm and played recordings of tracked vehicles before quickly retreating. On occasion the Iraqis fired at the sound with artillery. Fire-finder counterbattery radars immediately picked up the Iraqi rounds, allowing American artillery units to return fire and destroy Iraqi artillery positions.

SPECIAL RECONNAISSANCE

Special Forces continued to actively support the campaign plan by inserting reconnaissance patrols hundreds of kilometers deep into Iraq. The teams were emplaced principally near Highway 8 to detect any attempt by Republican Guard reserves to counterattack or retreat. The insertion of the teams went smoothly enough. Dailey's pilots in the

3-160th were old hands at special operations flying. They came in 20 feet off the desert floor at 140 knots in the dead of night and dropped their charges into isolated landing zones. Problems arose at daylight when the teams attempted to hide in terrain absolutely void of folds or vegetation. Not a hill, not a bush, not even a small depression was visible for miles. The ground was hard, usually with only a surface covering of sand. Although the ground is softer along the Euphrates River Valley, water in the valley meant crops and people. Good hiding places were nearly impossible to find.

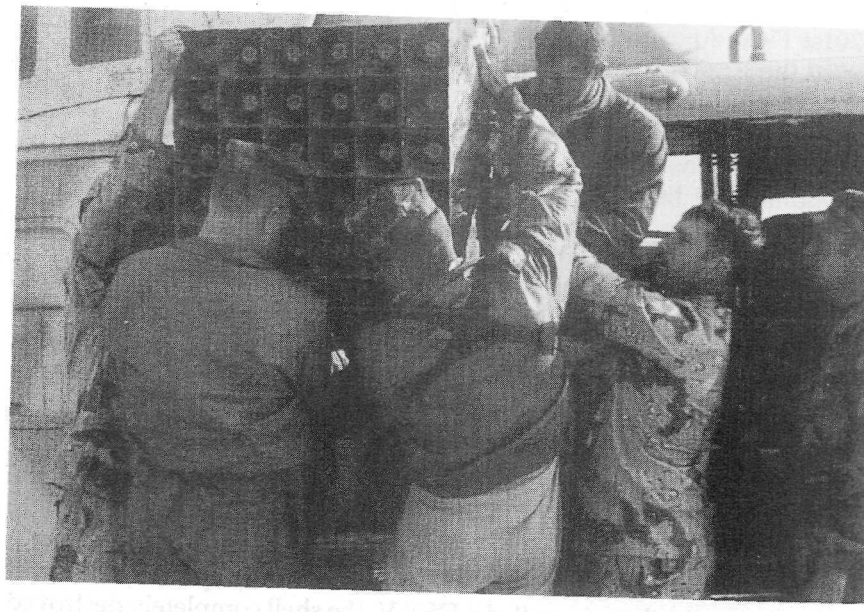
Still, ARCENT needed the intelligence and on February 23 eight Special Forces teams flew into Iraq. Several, unable to find hide sites in the barren terrain, were extracted; the Iraqis discovered others. Teams that chose softer cultivated areas to dig in soon found themselves surrounded by inquisitive farmers. Even so, such missions were not wasted efforts. Even in their often too brief stay, the teams confirmed for the ARCENT commander that no major reinforcements were headed into the KTO.

XVIII AIRBORNE CORPS: CLEARING THE WEST

XVIII Airborne Corps opened its pre-G-Day operations on February 15 with a series of cross-border reconnaissance missions. The 101st was one of the first to make contact with the enemy. That evening two teams of two AH-64s from the 1-101st Aviation crossed the border into Iraq on a route reconnaissance. Other Apaches screened the mission along the corps line of departure supported by EH-60 Quickfix and EF-111 Raven electronic warfare aircraft. Meanwhile, C Battery, 2-320th Field Artillery, displaced forward to provide fire support. The Apaches did not encounter the enemy, but later analysis of their mission videotapes showed an Iraqi position overlooking what would become MSR Newmarket.

On the 17th another team of Apaches, this one from the 2-229th Attack with Cobras from 2-17th Cavalry, flew north to engage the bunker complex. After hitting the position with 30mm cannon fire, the pilots were surprised to see 10 Iraqi soldiers emerge from the position to surrender. Calling forward the aviation brigade Pathfinder detachment, the Apaches covered the Iraqis until the ground troops arrived. Elsewhere, a similar engagement between another 2-229th team supported by C Company, 3-502d Infantry, resulted in the capture of 30 more Iraqis. All were from the 2d Battalion, 843d Brigade, 45th Infantry Division at as-Salman.

Documents captured in this unique operation revealed the 45th Division's subordinate headquarters locations. Prisoner debriefings confirmed the poor state of morale within the Iraqi infantry on the front lines and sparked an even larger raid on another Iraqi position nearby. The attack began at 0810 on February 20 as Apaches from 2-229th Attack and Cobras from 3-101st Aviation struck the target. A and B Companies of the 1-187th Infantry were on standby to secure the area. They did not



PSYOP loudspeakers were mounted on helicopters to support 101st pre-G-Day raids.

have long to wait before the Iraqis hoisted several white flags. Capitalizing on the first surrenders, a PSYOP team from the 311th MI Battalion dropped leaflets and used loudspeakers to persuade more Iraqis to give up. Shortly afterward, the 1-187th Infantry landed, swept the site, and captured 406 prisoners. The 101st raided the position again the next day, capturing another 13 Iraqi soldiers and eliminating an entire battalion without casualties. Moreover, the raid allowed the 101st to secure its MSR before the ground war began.[41] ARCENT soon encouraged other units to try the same technique.

Meanwhile, the 82d Airborne Division began armed reconnaissance missions along MSR Texas. At 0130 on February 18, the 82d and the Air Force teamed up to pound the 45th Infantry Division. A joint air attack involving four A-10s teamed with two attack helicopter battalions hit Objectives Rochambeau and White. Eleven AH-64s, three UH-60s, and one OH-58 from the 1-82d Aviation attacked Rochambeau, destroying bunkers, armored vehicles, and 18 of the enemy. Twelve AH-64s and three UH-60s from the 12th Aviation Brigade's 5-6th Cavalry pummeled White, destroying hangars, supply dumps, bunkers, and antiaircraft positions. The raids continued over the next several days. The 1-82d Aviation and the 5-6th Cavalry repeated the two-battalion-deep attack on the 20th, this time supported by the 1-17th Cavalry in a zone reconnaissance. The

1-201st Field Artillery, a West Virginia National Guard battalion, supported these raids. In one attack, the Guardsmen fired 227 rocket-assisted projectiles in support of a French action to clear passage points along the border.[42] On February 23 the 2d Brigade of the 82d, under the operational control of the French 6th Light Armored Division, seized an escarpment that dominated MSR Texas 30 kilometers north of the Saudi border.[43] Combined deep operations between the French and the 82d made the most of both units' strengths. While the 6th Light Division had limited helicopter night capability, they had a formidable daylight force in two combat aviation regiments. The 82d, augmented by the 12th Aviation Brigade, provided a potent night capability with up to three Apache battalions, enabling round-the-clock deep operations that crippled the Iraqi forces along MSR Texas.

Similar cross-border raids occurred in the 24th Infantry Division sector. The 24th's aviation brigade mounted deep attacks against the scattered Iraqi positions across the border. During the evening of the 19th, B Battery, 4-41st Field Artillery, attacked an Iraqi border post using a single Copperhead round. Guided by two lasers from a specially modified armored personnel carrier called a FIST-V, the shell completely destroyed the post and killed four enemy. Another Copperhead attack destroyed a second border post on the 21st. By the 22d, the 24th Infantry had virtually completed its preparation of the battlefield, and by the next day the same was true for all of XVIII Airborne Corps. Luck's divisions were poised to cut Highway 8 some 250 kilometers to the north.[44]

VII CORPS: DECEPTION AND PREPARATION OF THE BREACH

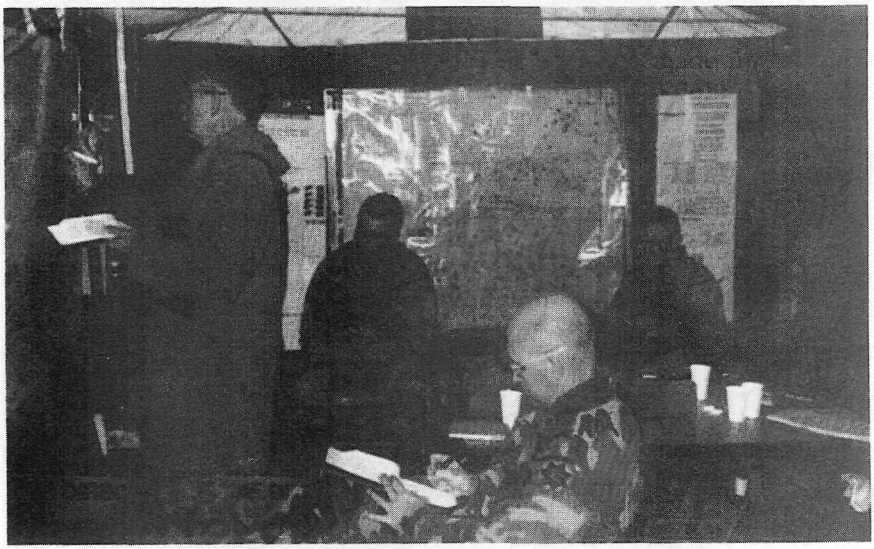
On Luck's right flank, VII Corps engaged in similar preparations. Yeosock placed the 1st Cavalry Division and the 2d Brigade, 101st Airborne Division, under the operational control of VII Corps to protect Tapline Road during XVIII Airborne Corps' move to the west. Franks seized that opportunity to move the 1st Cavalry Division well forward along the Wadi al-Batin just west of the Egyptian Corps. This move not only secured the line of communication, it also freed the 3d Armored Division from its counterattack mission enabling it to move west with the rest of VII Corps. Furthermore, it allowed Franks to conduct raids and feints to reinforce the deception effort and destroy Iraqi artillery.

Beginning on February 7, VII Corps Artillery and the 1st Cavalry Division began a series of artillery raids near the Wadi al-Batin. The raids served three essential purposes. First, Franks believed they would give the Iraqis another reason to think that the main Coalition attack would come up the wadi. Second, just as he insisted on a pre-G-Day rehearsal for maneuver, Franks knew the raids would provide the opportunity to shake out fire support, including strategic and tactical air power as well as

rockets and artillery. Third, Franks intended the raids to take down completely all Iraqi guns within range of the wadi. He remained most concerned about the danger posed by Iraqi artillery. The Air Force had done a good job so far in killing some artillery, but revetted guns were the hardest target for air power to kill and many batteries remained intact.

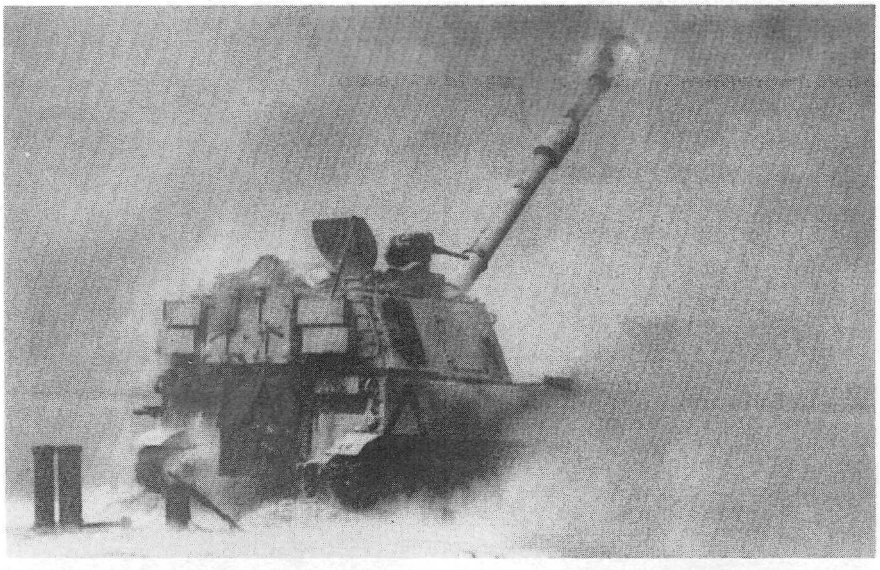
The most efficient way to kill artillery is with other artillery. Franks wanted to learn a bit more about the enemy's most enigmatic arm. So far he had a good idea from Khafji how well the Iraqi maneuver units would perform, but Iraqi guns were strangely silent there. Of all the Iraqi branches, the engineers and artillery came into the conflict with the best reputation for professionalism, and the overall quality of the artillery weapons was second to none. Of the artillery capable of reaching the breach, most were towed howitzers arrayed in a roughly continuous belt of guns 14 to 20 kilometers north of the berm. The majority of self-propelled artillery remained farther to the rear with the operational and theater reserves. Brigadier General Creighton Abrams, Jr., the VII Corps artillery commander, kept his shorter-ranged tubes well back in assembly areas. To reach the Iraqis during the raids, they were obliged to march to the southern edge of the berm, fire, and then withdraw.

General Tilelli's 1st Cavalry Division fired the opening round of the pre-G-Day firepower battle on February 7. At 1400, an artillery forward observer FIST-V eased up just behind the berm, raised its "hammerhead" sight, and lased an Iraqi observation tower 5 kilometers to the north. These 40-foot-high towers were a particular nuisance because in the flat



Franks and Abrams planned pre-G-Day artillery raids with their staff.

Brigadier General John Tilelli (third from the left) discusses a pre-G-Day raid with his commanders and staff.



1st Cavalry guns fired at maximum range to engage distant Iraqi batteries. Superior precision and lethality gave US artillery a distinct edge; however, Iraqi guns could shoot farther.

terrain they could see as far as 30 kilometers into the American sector. They were so small that neither "dumb" artillery projectiles nor bombs could hit them. A 155mm howitzer located 10 kilometers to the rear fired a single laser-guided Copperhead projectile. Thirty seconds later the first of seven towers disappeared in a flash of light and black smoke. An adjacent battery followed the Copperhead shot by dropping 400 bomblets on the target, killing anyone near the tower.

On February 13, artillery action accelerated with a carefully choreographed raid conducted by three MLRS batteries, two from the 42d Field Artillery Brigade and one from the 1st Cavalry. At dusk, the three batteries—27 launchers in all—crept up to the berm. The crews in 18 launchers punched previously located targets into their fire-control computers and the huge box-like launch pod containers, each holding 12 rockets, automatically slewed toward the targets. At precisely 1815, soldiers standing at the berm watched as 216 rockets rippled away with successive roars, leaving behind white smoky fingers pointing toward Iraq. A few seconds later, a succession of white puffs appeared just above the horizon as warheads popped open to disgorge 140,000 bomblets on top of the hapless Iraqi batteries. Launcher crewmen nicknamed the MLRS "the grid square removal system" for good reason. The third MLRS battery was linked directly to the Q37 counterbattery radar. Should the Iraqi artillery shoot back, only a few seconds would be needed for the radar to pinpoint the target and the rocket battery to smother it with another 70,000 bomblets. In this engagement and in all subsequent artillery ambushes executed before G-Day, the Iraqis never took the bait. Relief among VII Corps artillerymen was mixed with curiosity. What had happened to Saddam's most fearsome arm?

In a word, Saddam's artillerymen had simply failed to make technological improvements in their over-the-hill gunnery that had been available for 20 years. Surprising their Israeli opponents, the Egyptians dramatically demonstrated the precision-guided munitions revolution in the opening tank and antitank missile engagement in the October '73 War. The precision revolution progressed more slowly to indirect fire because to hit an unseen target with the first round required refinements in the ability to locate both the target and the firing position, as well as the ability to predict very accurately the ballistic course of a projectile. Ballistic refinement arrived with the development of digital fire-control computers, precise weather-measuring devices, and devices to measure the velocity of a projectile in flight. Target-acquisition radars, laser range finders, and the now indispensable GPS allowed a similar precision in locating targets and firing positions. If all of the parts are assembled and employed properly, the radius of error for a "dumb" artillery projectile is easily cut in half. DPICM or bomblet artillery munitions, in turn, have almost tripled the kill radius for artillery. This quantum jump in precision

and lethality meant that for the first time in history the artillery kill radius was greater than its radius of error. In other words, if American artillery shot at an Iraqi position, it died. Iraqi artillery, on the other hand, possessed long range but little else. The Iraqis avoided activating what few artillery radars they did have for fear of immediate detection and destruction. They had failed to invest in the technology necessary to achieve a first-round kill, learning the hard way that range without precision is no advantage at all.

The biggest pre-G-Day firepower raid occurred on the night of February 16 and early morning of February 17 with a combined artillery and attack helicopter feint by VII Corps artillery and the Apaches of 2-6th Cavalry from the 11th Aviation Brigade. Five battalions opened a 2-kilometer-square corridor by saturating the Iraqi air defenses with artillery fire. Five kilometers into Iraq, Lieutenant Colonel Terry Branham's squadron fanned out into a line about 15 kilometers wide. Artillery continued to pound targets on the sides of the formation and beyond the objective area.

Branham's Apache crews selected their targets 10 kilometers from the objective and then waited to reach a prearranged firing line 2 kilometers farther north. The squadron moved forward at just under 30 knots and fired continuously for nearly five minutes. Each troop and crew worked its sector of the target area, a line of towers and communications buildings. After five minutes, the Apaches broke for the border, reaching it within seconds of the planned recrossing time. Franks and Abrams observed the feint from the 1st Cavalry Division Artillery command post. Linked to the corps deep battle cell and the 11th Brigade command and control aircraft by TACSAT, the entire operation was a carefully rehearsed drill for later deep attacks. Just before the attack began, an orbiting electronic warfare aircraft hit on an active Iraqi antiaircraft radar directly in the planned path of the Apaches. A quick adjustment to the fire plan sent 12 MLRS rockets to turn off the radar permanently.

As the pre-G-Day raids progressed, problems began to appear. The first was with targeting. Wide-area satellite imagery could only locate Iraqi artillery to within about 400 meters. To hit the target reliably with artillery required a precision of at least 100 meters. Therefore, while imagery might provide a wealth of information, each prospective target identified on available satellite photos had to be confirmed by a second, more precise locating source before it could be hit. The preferred method was to overfly an area with one of the UAVs assigned to VII Corps. To keep up with the demand for target-quality intelligence, Franks decided to use his drones for targeting first and intelligence collection second. Battle damage assessment, however, remained a nagging problem; not enough UAVs were available both to target the enemy and to reassess previous strikes. If the target was moving, JSTARS also gave great

"Steel rain" from an MLRS battery filled the night sky during a 1st Cavalry Division counterbattery raid February 21, 1991.

The MLRS effects were devastating. Iraqi artillery was never able to return fire effectively.

precision, but the firing unit had to be readily available to engage the target quickly. Should the enemy artillery open fire, counterbattery radars provided the most precise and immediate locations.

The many layers of bureaucracy charged with integrating the indirect fire support function frustrated early attempts to establish a responsive indirect fire program. Too often, important targets such as FROG rocket battalions moved before they could be targeted. Once struck, BDA was still a problem and VII Corps was never able to determine accurately how many tanks and artillery pieces remained in its path. To improve indirect fire support, Abrams and his deputy commander, Colonel Raymond Smith, who served as the corps fire support coordinator, empowered junior staff officers to order indirect fire strikes themselves by comparing detected targets with a current target priority list. If the target met the engagement criteria, the officers could attack it.

The last major deception effort occurred on February 20 and involved Colonel Randolph House's 2d Brigade, 1st Cavalry Division, in a reconnaissance-in-force maneuver directly into the Wadi al-Batin. On the evening of the 19th, Lieutenant Colonel Michael Parker's 1-5th Cavalry sent a company across the berm to check out crossing points and to look for mines. The rest of the 2d Brigade jumped off at noon. Ten kilometers into the wadi, 1-5th Cavalry engaged an Iraqi infantry battalion supported by tanks, BMPs, and artillery. A Company led the 1-5th Cavalry's diamond formation with its Bradleys and made first contact. The trailing tank companies pulled up alongside and supported the infantry fighting vehicles, hammering the position with main-gun fire. Finishing the action soon appeared to be just a matter of rounding up prisoners from a nearby bunker complex. [45]

The combat was not one-sided. Since February 7 when Tilelli's division began probing the wadi, the Iraqis had reinforced the area. Under cover of darkness, they brought in additional artillery and antitank guns. They dug an AT-12 battery of 100mm antitank guns in along the shallow walls of the wadi. The Iraqi gunners allowed the 1-5th Cavalry's point element to pass and waited for the initial action to wind down before they engaged the middle of the formation from the flanks. The 100mm guns hit three of the brigade's vehicles, a Vulcan carrier and two Bradleys, and an M-1A1 tank struck a mine. Three American soldiers were killed and another nine wounded. House extracted the brigade after destroying the AT-12s with a combination of A-10 aerial attacks and indirect fire. [46]

Despite its cost, the action guaranteed that the Iraqis would continue to look for the main attack through the Wadi al-Batin. It also proved conclusively that at least some Iraqis were still willing to fight after 33 days of air attack. This was a valuable lesson that Franks discussed with his commanders. If the Iraqis were given time to organize a defense and

if friendly attacking formations drove into that defensive zone, losses could still be high. This reinforced the need for speed and a massed fist to attack the Republican Guard before they could react and reorient their defenses against the main attack.

A FINAL ASSESSMENT

With the closing moments of the pre-G-Day air operation drawing near, General Stewart used a combat effectiveness model as a safety check on his assessment of damage inflicted by Coalition air attacks. Stewart's analysts had developed the technique to provide greater understanding of the state of Iraqi combat forces. Using the BDA figures as a start point, the model incorporated data on leadership, command and control, discipline, and morale. Most importantly, it emphasized the differences in the will to fight among the three distinct levels of Iraqi units.[47]

Baghdad's frontline infantry units had been the hardest hit. The 4th Corps in southwest Kuwait and 7th Corps west of the Wadi al-Batin made up the Iraqi forward defenses in ARCENT's sector. Largely composed of recalled reservists, the two corps were at the low end of the Iraqi military pecking order even before the war began. Now Stewart judged 4th Corps to be about 58 percent combat-effective. The 7th Corps, made up of the bottom of the Iraqi manpower pool, was at 42 percent.[48] Both might put up a limited defense in place.

Behind the forward defenses were the reserves, made up of the regular army heavy divisions. Some, like the Iraqi 7th Corps' 52d Armored Division, were only 50 percent combat-effective. Others, like the 1st Mechanized and 6th Armored Divisions, retained substantial combat power as 4th Corps' operational reserve. The 1st Mechanized was the strongest, estimated at 90 percent combat-effective. It might—as it had in the Khafji operation—move forward in a true counterattack.[49] More regular heavy divisions remained intact as part of the theater reserves. The Jihad Corps—the 10th and 12th Armored Divisions—retained an average combat effectiveness of 59 percent. Stewart believed both would attempt to fulfill their role as a GHQ reserve counterattack force but predicted significant problems in command and control.[50]

Colonel Mohammed Ashad, commander of the 50th Armored Brigade, 12th Armored Division, was, in the words of one observer, "a cocky bastard" totally dedicated to his brigade of T-55s. Based on remarks that during the war with Iran he had "lived in [his] tank and loved [his] tank," he appeared to care more for his tank than he did his family. Originally part of the 6th Corps, the 50th had deployed into the KTO in September as part of the 12th.

Even with a hard-nosed commander like Mohammed, morale in the 50th was not good. No one felt the call of battle as some had in the war

Two days before ground operations, inteligence estimates showed most of the frontline infantry units at below 50 percent capability while all of the Republican Guard units were between 50 and 75 percent.

against Tehran. Rather, they approached deployment to the KTO with trepidation. Keeping up the men's spirits was difficult as they sat in the same revetments since September; 20 percent had deserted by late February. The best Mohammed could do was to keep his men busy working on their tanks—a challenge in itself.

The 50th's tanks—like 90 percent of the regular army heavy units—were tired horses. Track wear was heavy and batteries were in short supply. Engines designed for the plains of Europe ran hot, and the addition of side skirts and exhaust deflectors only increased that tendency. Only a man "with the army in his blood" could love such a stable of doubtful mounts. Nevertheless, Mohammed was determined that when the order to move came, his unit would be ready.

The air operation tested but did not break that resolve. Although worried by the continual flights of aircraft headed north toward Iraq, the 50th was not hit until January 19 when an A-10 made an ineffectual attack from high altitude. Soon the attacks grew in intensity, especially against soft-skinned vehicles like trucks and tankers. APCs and tanks, protected by revetments and carefully camouflaged under Mohammed's intense supervision, fared much better. As a result, the 50th lost only eight tanks and a handful of other armored vehicles to the air attacks. Thanks to its commander's resolve, the brigade had survived when its sister unit, the 46th, had not.

At the top of the Iraqi military hierarchy, the Republican Guard remained the greatest threat with a composite strength of 66 percent. Stewart knew that the Guard retained the will to fight. Even the Tawakalna, the most heavily battered of the three Guard heavy divisions, stood at 57 percent of its prewar combat effectiveness. Unable to mount a classic divisional counterattack, the Tawakalna would fight by brigades. Although the Medina Armored Division had lost a brigade's worth of tracks, it still had 65 percent of its fighting strength and the requisite command and control to mount division-level attacks. Its sister, the Hammurabi Armored Division, could muster 72 percent of its combat power. Like the Medina, the Hammurabi remained capable of division-level counterattacks. If such an attack proved impossible, Stewart believed the Hammurabi might be used to defend Basrah. As for the Guard infantry divisions, they were all above 60 percent combat-effective but would probably serve as a blocking force or assist in defense of Basrah.[51]

The Tawakalna was a newly formed Republican Guard division comprised of brigades bloodied in the war against Khomeini. Two brigades were mechanized infantry equipped with BMPs. The 9th Brigade,

the only armored brigade, had T-72M1 tanks equipped with infrared sights and in some cases laser range finders.

The men of the Tawakalna's 55th Battalion, 9th Tank Brigade, sat out the air attacks comfortably in their bunkers. Inside Iraq, closest to the nexus of the KTO supply line, they were well fed and cared for, especially when compared with the less fortunate infantry farther south. To protect their tanks, the crews built several revetments for each and placed wooden dummies as decoys in empty ones. Whenever fighter aircraft appeared, they lit tires and oil drums beside undamaged tanks to make the pilots believe the tanks were burning hulks.

The mission of the 55th Battalion of the Tawakalna was to defend in place and counterattack if possible. Lieutenant Saif ad-Din, commander of 3d Platoon, 1st Company, had all three of his tanks fueled and loaded. His eight soldiers were well-trained, unbowed, confident, and anxious to fight.

Stewart's final pre-G-Day assessment was that 41 days of the air operation had indeed battered and fixed the Iraqi army, but its central corps of heavy units—especially those in the Republican Guard—had not been defeated, much less destroyed. Much of the Iraqi second echelon, to include the "go-away brigade," had been beaten down successfully by air strikes and artillery. General Franks would be able to ride roughshod over the frontline infantry units, but he still had a significant fight waiting for him deep in Iraq. Five divisions of the Republican Guard formed an unbroken barrier in his path. The war would not be won until the Guard was destroyed.

Notes

1. Interview with Lieutenant Colonel Dick Cody, March 17, 1992.

2. *ARCENT MI History*, pp. 7-13. The figure of 41 divisions is due to General Stewart's postwar assessment of the Iraqi forces in the ARCENT sector. Prewar assessments determined that 43 divisions were in the KTO and placed the Iraqi 31st and 47th Infantry Divisions in the forward defenses facing VII Corps. Neither division was encountered in that area and the 24th Infantry Division captured only a small number of 47th Infantry soldiers in the area near an-Nasariyah. Hence, the strength in divisional units was readjusted to 41.

3. Department of Defense, *Conduct of the Persian Gulf War: Final Report to Congress Pursuant to Title V of the Persian Gulf Conflict Supplemental Authorization and Personnel Benefits Act of 1991 (Public Law 102-25)*(Washington, DC: April 1992), pp. 122-125, hereafter cited as *Title V*. (*Title V* is available in classified and unclassified versions.)

4. *Ibid.* p. 6.

5. *Ibid.* p. 6-99.

6. *Ibid.* pp. 6-98 thru 6-100.

7. Brigadier General John Stewart, Jr., "Operation Desert Storm, The Military Intelligance Story: A View From the G2, Third US Army," April 1991, pp. 12-13.

8. Ibid. p. 15, and *ARCENT MI History*, pp. 6-2 and 6-3.

9. USCINCCENT message dated 100043Z August 1990, "Joint Stars Deployment To Saudi Arabia."

10. USCINCCENT message dated 031713Z September 1990, "JSTARS Deployment."

11. DAMO-FDI Executive Summary, "JSTARS Status Inquiry," August 22, 1990; DA ODCSOPS memorandum for Mr. Lawrence Prior, HPSCI, "HASC Marks and Desert Shield," September 6, 1990; DAMO-FDI memorandum, "HQUSAF Position on Deploying JSTARS," September 20, 1990; DAMO-FDI Executive Summary, "Joint Surveillance Target Attack Radar System (JSTARS) Deployment," October 2, 1990.

12. *ARCENT MI History*, pp. 6-94 and 6-95.

13. Interview with Colonel Robert Noonan, April 14, 1992.

14. *ARCENT MI History*, pp. 6-86 and 6-97.

15. *Ibid.* pp. 6-95 thru 6-97.

16. *Ibid.* pp. 6-87 through 6-90, and Lieutenant Colonel William Doyle's memorandum, "Deployment of TROJAN in Desert Storm," May 8, 1992.

17. *ARCENT MI History*, pp. 6-86 thru 6-101.

18. Stewart, p. 4.

19. As quoted by Colonel Thomas Leavitt and Major Thomas Odom.

20. *ARCENT MI History*, Vol 6, p. 131, "Imagery Support for Point Targets," JULLS Input No. 13355-39800(00003).

21. Colonel David Schulte, "Notes as Chief, BCE, Desert Storm," p. 37.

22. Interview with General Frederick Franks, Jr., April 30, 1992.

23. Robert M. Stein, "Patriot ATBM Experience in the Gulf War" (Draft), February 28, 1992, pp. 19-20.

24. *US News and World Report* Staff, *Triumph Without Victory: The Unreported History of the Persian Gulf War* (New York: Random House, 1991), pp. 246-247.

25. Schubert and Kraus, pp. 21-23.

26. Captain Eric Kennedy, memorandum, "Deployment of Sandcrab in Desert Storm," May 8, 1992; *ARCENT MI History*, Chapter 10, p. 10-17; and ARCENT Lessons Learned Report, p. 56.

27. Stewart, p. 19.

28. *Ibid.* pp. 19-20, and Major General John Stewart, Jr., DCSINT USAREUR, memorandum for HQ TRADOC ADCSCDD, "Desert Storm," March 18, 1992.

29. *Ibid.*

30. *ARCENT MI History*, pp. 21-23.

31. *Ibid.* p. 6-72, and Schulte, p. 37.

32. Brigadier General Creighton W. Abrams, Jr., "VII Corps Artillery Commander's Report, Operation Desert Storm," March 1991.

33. Schulte, pp. 43-44.

34. *ARCENT MI History*, p. 6-74.

35. *Ibid.* Chapter 8, Annex E, and ARCENT INTREP/O2/222100Z January 1991.

36. *Ibid.* and ARCENT INTREP/29/091000Z February 1991.

37. Defense Special Assessments, January 29-30, 1991; CIA spot commentaries, January 29-30, 1991; ARCENT INSUMS, January 29-30, 1991.

38. USA John F. Kennedy Special Warfare Center and School, "USA Special Operations Lessons Learned, Desert Shield/Storm," undated, pp. 3-10.

39. HQ USCENTCOM OPLAN Desert Storm 001, January 5, 1991, pp. B-1, B-2, and C-3.

40. USAJFKSWC, pp. 3-10.

41. 101st Airborne Division (Air Assault), "History of Operation Desert Shield/Operation Desert Storm," signed Colonel William J. Bolt, chief of staff, undated, pp. 35-43.

42. 1-201st Field Artillery, "196th Field Artillery Brigade After-Action Report, Operation Desert Shield," April 29, 1991.

43. 82d Airborne Division Command Report Narrative, "Operation Desert Shield and Desert Storm," pp. 8-10.

44. XVIII Airborne Corps Operation Desert Shield Chronology (from August 7 through redeployment).

45. *US News & World Report* Staff, pp. 285-287.

46. *Ibid.*

47. *ARCENT MI History*, Chapter 8, Annex A, Appendix 2, and ARCENT INTREP/40/171500Z February 1991, "Combat Effectiveness Assessment Methodology."

48. ARCENT INTREP/40/171500Z February 1991; ARCENT INTREP/44-91/220700Z February 1991; ARCENT INTREP/45-91/220900C February 1991; ARCENT INTREP/46-91/220901C February 1991; ARCENT INTREP/47-91/210902C February 1991.

49. *Ibid.*

50. *Ibid.*

51. *Ibid.*